Northeast Lau Basin Response Cruise (NELRC)

R/V *Thomas G. Thompson* Expedition TN-234

May 5 - 13, 2009

Apia Samoa - Apia Samoa

***Jason-2* Dives J2-413 to J2-420**

Chief Scientist: Joseph Resing

Co-Chief Scientist: Robert Embley

***Jason-2* Expedition Leader: Tito Collasius**

Cruise report prepared by: Susan Merle

Magma bursts from the main ediface at Hades and pillow lavas flowing downslope

Magma gas bubble at Hades eruptive vent

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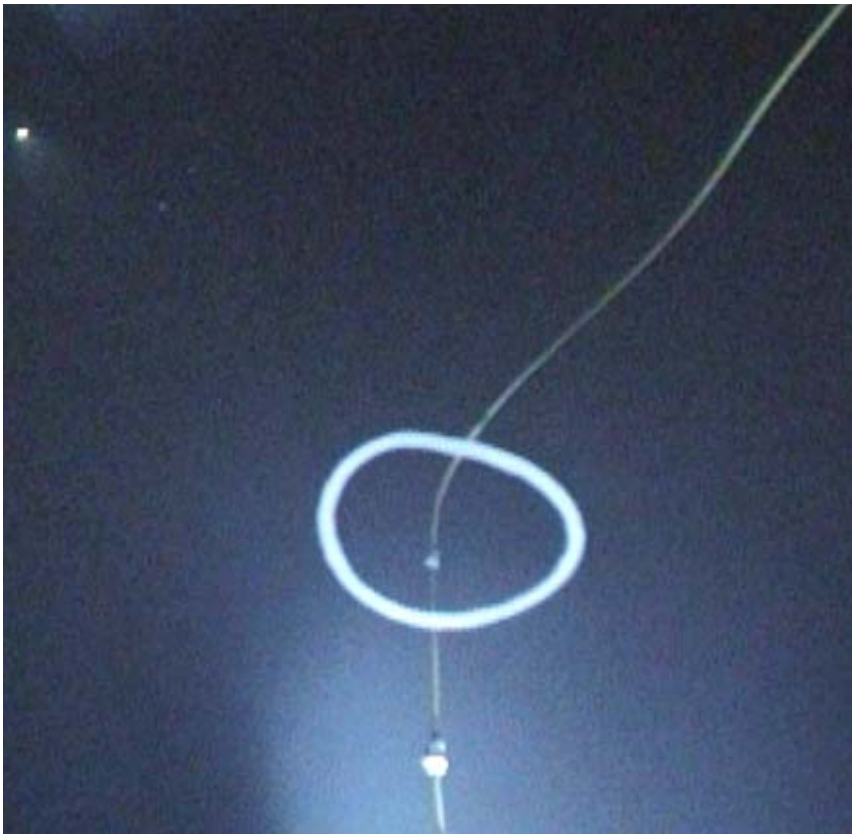
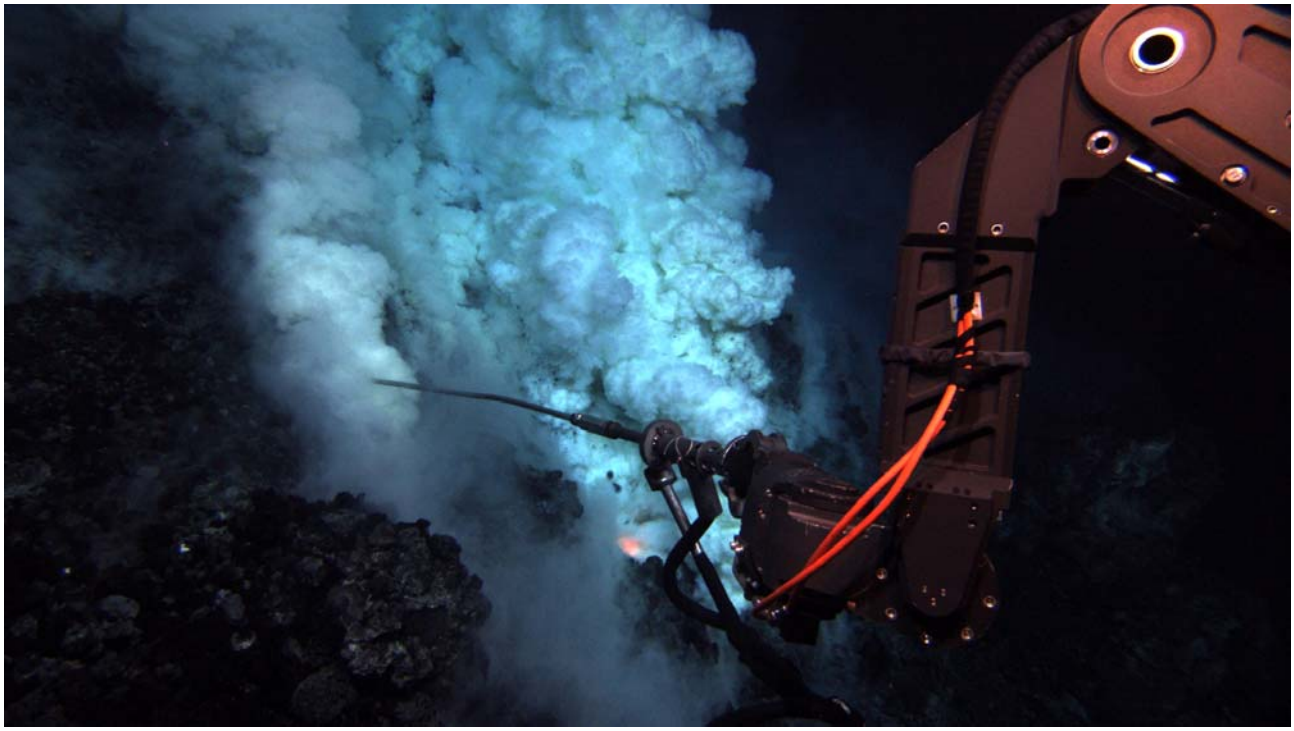
NELRC Image Highlights

Hades J2-414 (W Mata). Magma is visible to the left of the sulfur-laden plume. Image ~ 2m across.

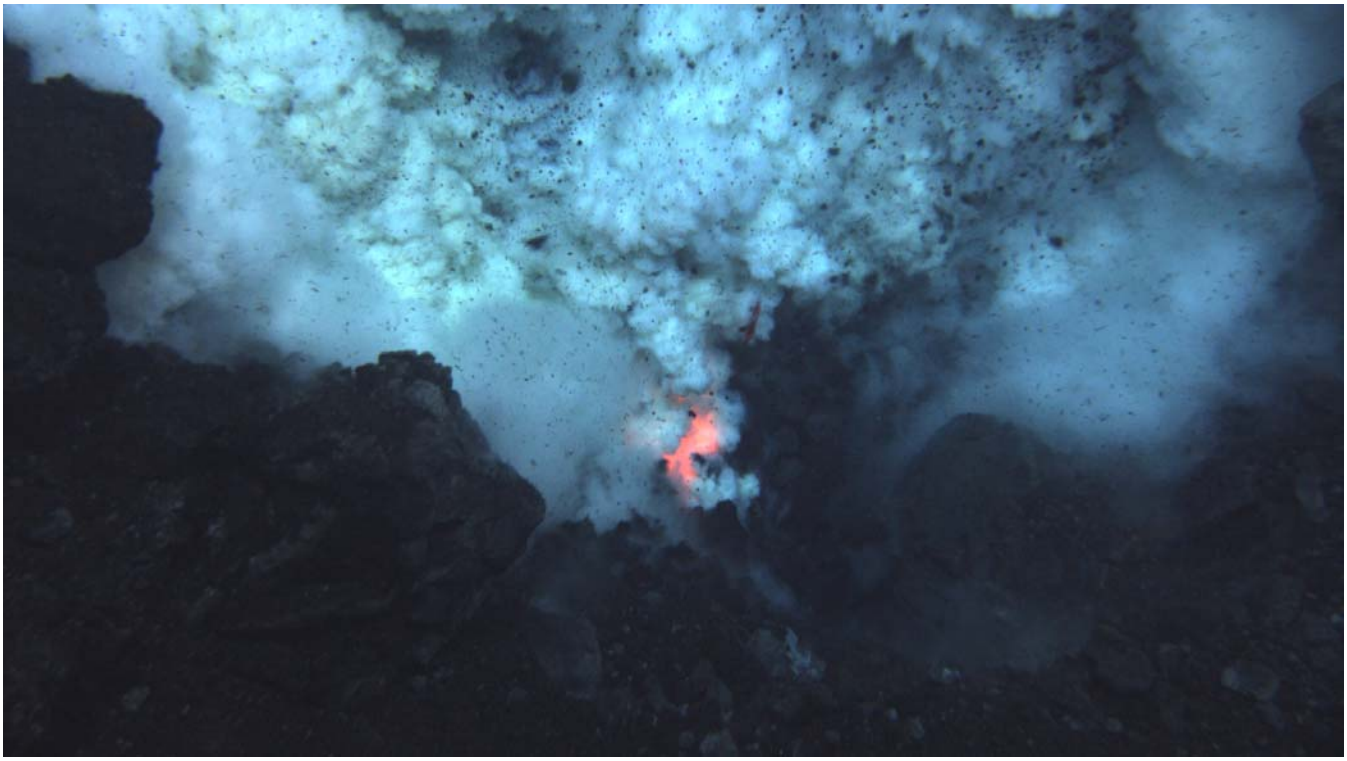


Above Hades J2-420 (W Mata). Smoke ring from Hades eruption captured by Medea's camera.

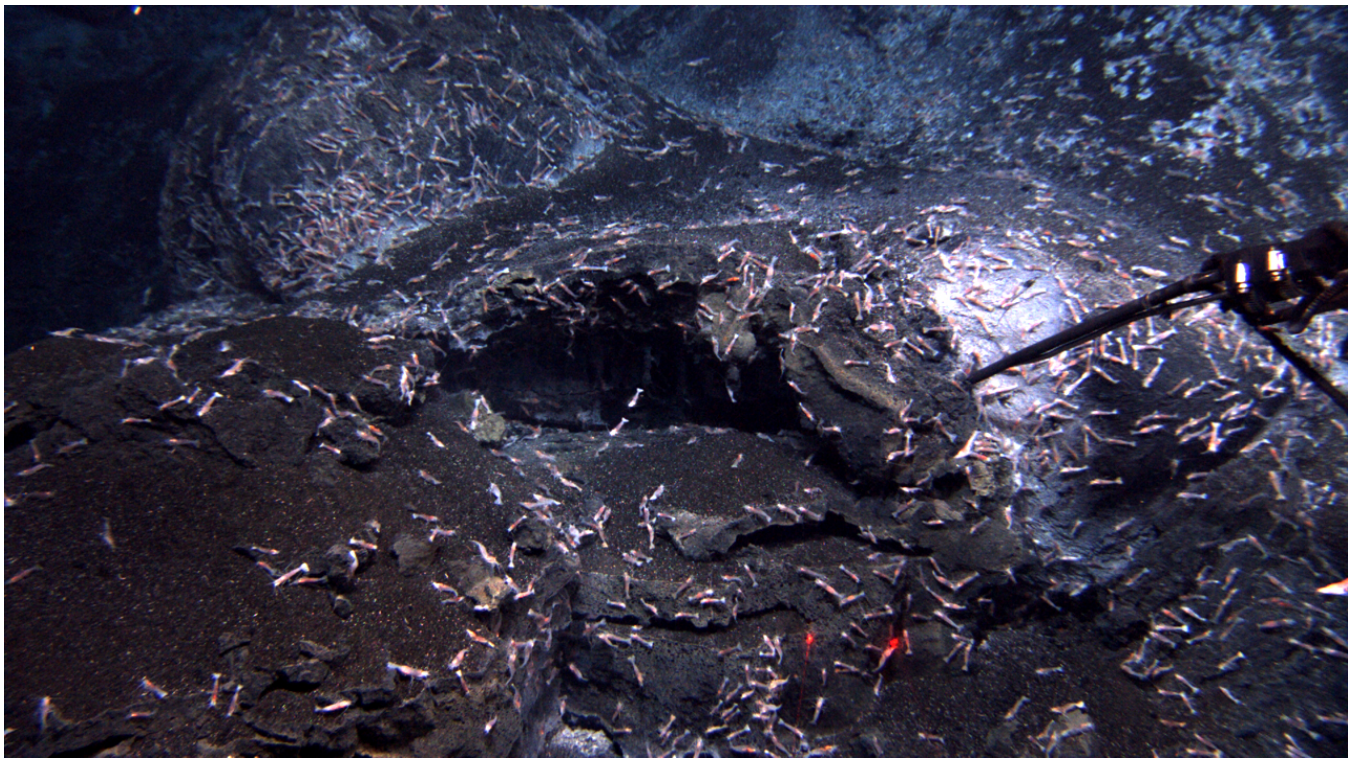
Hades Area J2-420 (W Mata). Pillow lava flowing downslope from Hades.



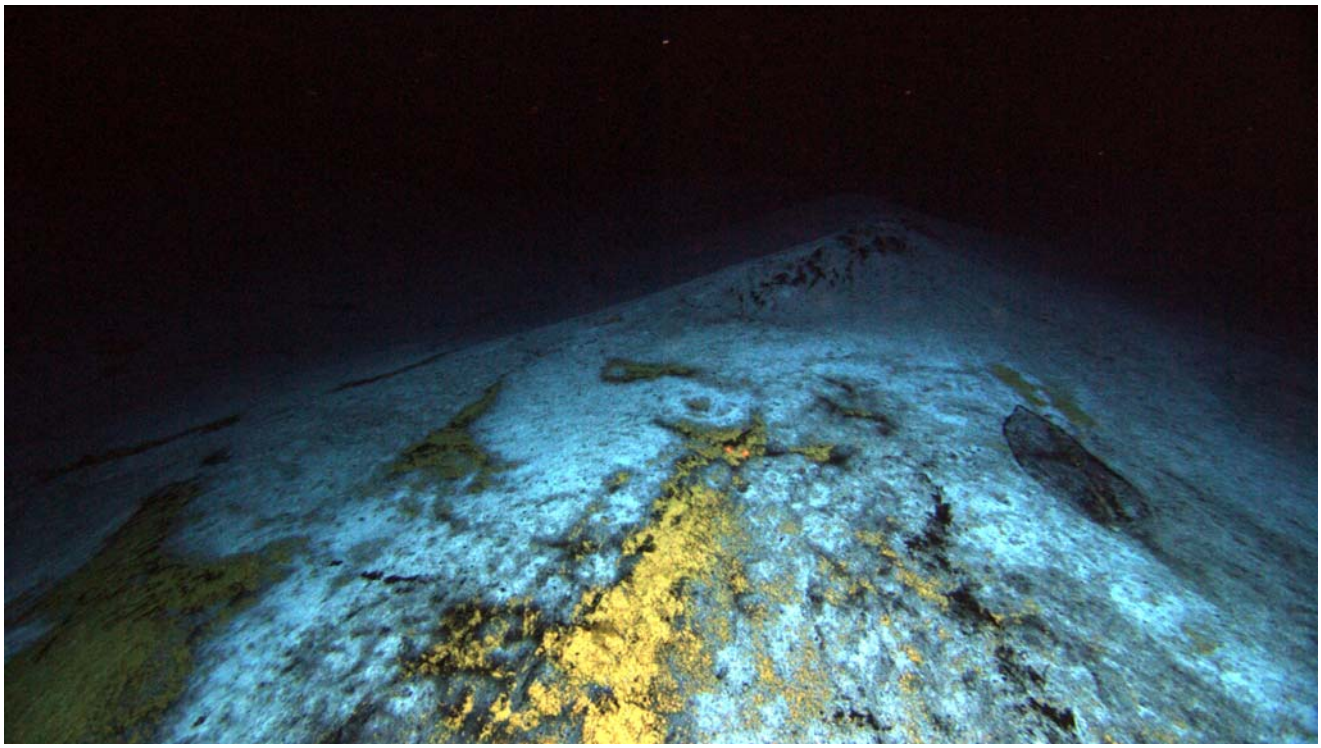
Hades Area (Akel's Afi?) J2-418 (W Mata). Fluid sampling at an eruptive vent in the Hades Area. Fluid sampling "wand" ~1m long.



Prometheus J2-417 (W Mata). Eruptive venting of magma, tephra and a sulfur-laden plume at Prometheus. Image ~ 3m across.

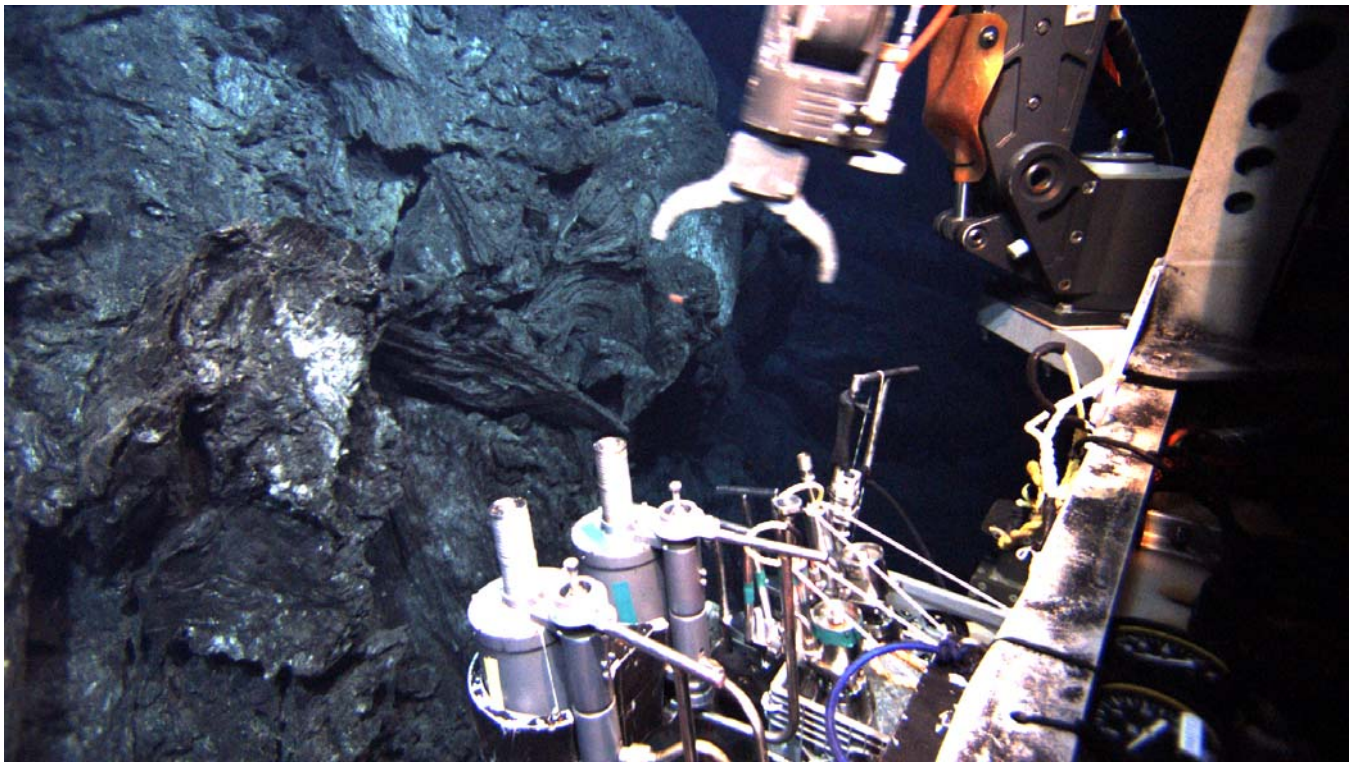


Near Prometheus J2-418 (W Mata). A plethora of shrimp in the vicinity of Prometheus near the summit.

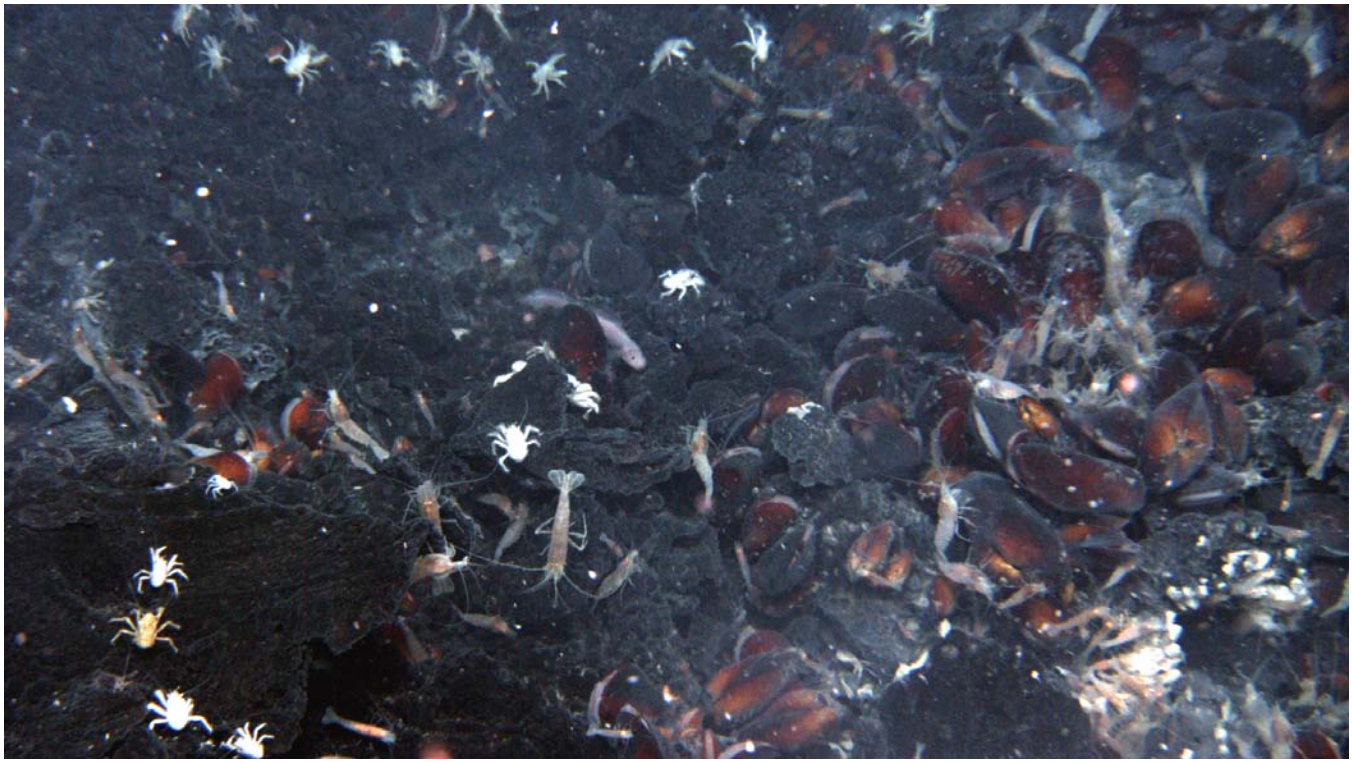


Mat Meadow J2-417 (W Mata). Large expanse of white, and some orange, mat overlaid on the volcaniclastic sediments on the SW ridge crest. Image ~4m across.

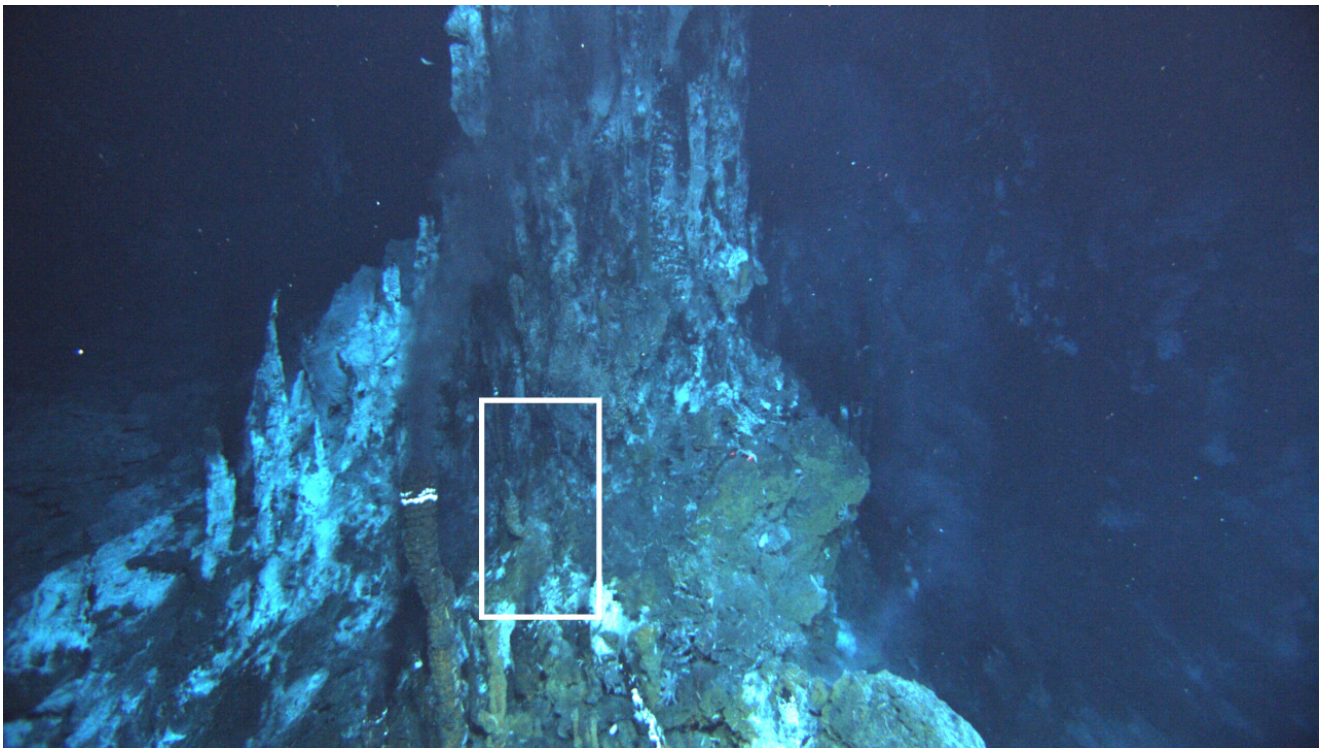
Red Rock Ridge J2-418 (W Mata). Fluid sampling in the diffuse flow.



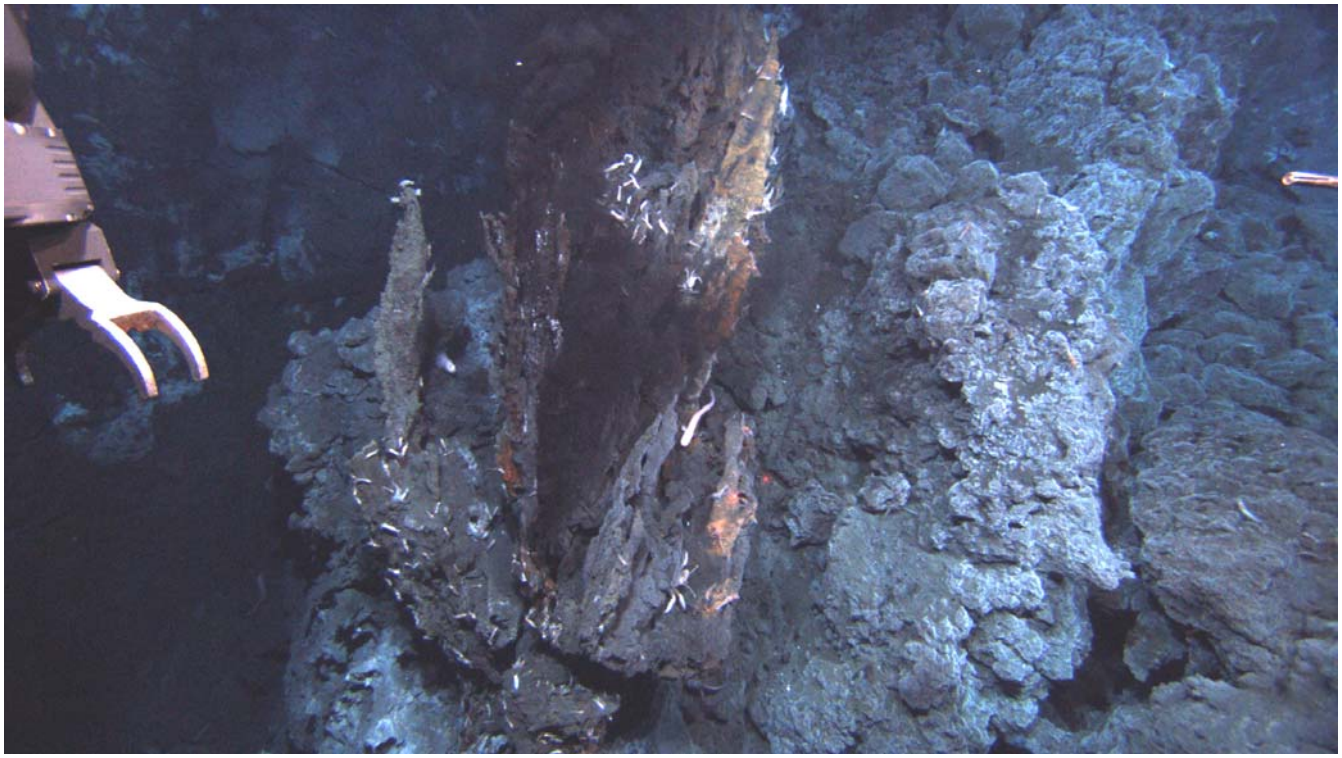
NELSC J2-415. "Puipui" curtain lava flow, probably November 2008 eruption. Rock sample suspected to be "zero age".



NELSC J2-415. Diffuse venting and diverse biota in the area of Nautilus vent.



Maka J2-416 (Southern NELSC). Sulfide mound with small black smoker chimneys. Image is 5+ meters across. White box indicates area of small black smoker chimney is image below.



Maka J2-416 (Southern NELSC). Vent biology on this small black smoker chimney. Chimney is visible in the lower center of the above image.

1.0 NE LAU RESPONSE CRUISE (NELRC) SUMMARY

Joseph Resing and Robert Embley

Summary

This eruption response cruise was aimed at visiting the sites of two recent eruptions in the NE Lau Basin discovered in November 2008 during an expedition on the R/V. *T. G. Thompson.* The response expedition went expecting to find recent eruption deposits at both sites, and hoping to find at least one site still in eruption, which is what we found (at W. Mata volcano). The cruise subsequently spent 6 days characterizing the volcanic deposits and associated phenomena, providing fundamental new insights on eruptive phenomena in this environment, including the first observations of molten lava actively erupting in the deep ocean.

Background and Rationale

The first suspected eruption site was discovered at the southern segment of Northeast Lau spreading center (NELSC) and the second was at West Mata, a small submarine volcano lying between the NELSC and the frontal magmatic arc of the Tonga-Kermadec subduction zone. (Figs.1 and 2) Hydrothermal water column plumes found 800-1000 m above the suspected location of the eruption at the NELSC in Nov. 2008 contained high concentrations of volcanic glass shards and H_2 (> 3 uM). The combination of the extreme elevated dissolved H_2 concentrations and the presence of sharp edged shards provided unambiguous evidence of the interaction between molten rock and seawater. Near-bottom temperature anomalies >0.5°C over a small region of the neovolcanic ridge indicated the likely location of the eruption.

The NELSC event posed the first opportunity to compare the geologic style of back-arc volcanic accretion and environmental impacts to ones documented over the past two decades on other ridges (Juan de Fuca, Gorda, EPR) and seamounts (Loihi, NW Rota). Responses to volcanic events on the Juan de Fuca Ridge and East Pacific Rise spreading centers during the past two decades have resulted in new insights on chemical, biologic and geological processes, including: (1) volumes and extent of eruptions with major insights on how the ridge is constructed through time (Chadwick and Embley, 1994; Embley et al., 2000; Fornari et al., 1998); (2) the biological responses to eruptions (Cowen et al., 2004; Huber et al., 2003; Shank et al., 1998; Tunnicliffe et al., 1997), (3) the chemical evolution following magmatic perturbations (Butterfield et al., 1997; Lilley et al., 2003; Von Damm et al., 1995); and (4) the discovery and sampling of the subsurface biosphere beneath the midocean ridge (Cowen et al., 2004; Delaney et al., 1998; Huber et al., 2003). In addition to these fundamental questions there is also the overarching question of how submarine volcanism and hydrothermalism works at a variety of geologic settings, depths and magma composition. The NELSC results could also potentially provide the first data on eruption style (i.e., effusive vs. fragmental), the extent and volume of eruptives, and serves as a baseline to compare future eruptions in the back-arc environment.

In Nov. 2008, the second eruptive site, W. Mata, had an intense plume rising ~175 m with among the highest values of turbidity, H2 (> 9000 nM), ^{3}He, oxidation-reduction potential anomaly, and pH anomaly ever measured in a hydrothermal plume. There was an abundance of large (10-70 uM in length) shards in the plume composed almost exclusively of Mg-silicates and Ca-Mg-silicates. High acoustic backscatter derived from the *Thompson's* EM300 multibeam sonar system was consistent with very young/current volcanic activity. This was a very exciting result, because W. Mata would represent only the second site on the planet where we could study an erupting submarine volcano. Studies of the long term eruption at NW Rota-1 volcano in the Mariana arc have provided dramatic first insights on the physical volcanology, chemistry and biology of a submarine eruption (Embley et al., 2006; Chadwick et al., 2008: Resing et al., 2008; Walker et al., 2008; Limen et al., 2006). The W. Mata site is much deeper and could represent one of several very young eruptive centers in the area. The SW-NE striking trend of West and East Mata and several ridges to their northwest suggest that recent volcanic activity is concentrated along tear faults possibly induced by disruption (rifting) of the crust at the northern termination of the Tonga subduction zone. Boninite lavas (SiO2 >53% with Mg/[Mg+Fe2+] >0.6 have been recovered in dredges (Falloon et al., 2007) in the proto-rift zone northwest of W. Mata. This entire area is very hydrothermally

active, with vents at both West and East Mata and at a large, complex, oblong volcano lying to the east (Niua). W. Mata represents the first opportunity to sample magmatic fluids from a boninitic magmatic system.

The NELSC and Mata eruptions will provide insight on the long-term history of a back-arc rift zone, with the W. Mata site representing a proto-backarc system (young rifted crust) and the NELSC site the established backarc spreading system. In addition, a chemical study of the magmatic/hydrothermal fluids from a W. Mata eruption with nearby hydrothermal systems would likely yield new insights into evolution of fluids in arc and backarc environments.

It was deemed critical to collect the volcanic and hydrothermal products of the eruption sites as soon as possible to understand the evolution of hydrothermal venting and biological succession in the context of observations at other back-arc sites, most notably those at the Ridge 2000 Eastern Lau Integrated Studies Site. Recent results from the Manus Basin, the Mariana Arc, and Valu Fa ridge on the ELSC suggest that there is a transition in hydrothermal systems from those dominated by magmatic fluids rich in S, C, and H_2O and other slab components, to systems dominated by the interaction between hot rock and seawater. It appears that the Lau ISS is currently in this latter state of evolution. Observing the early stages of magmatism and hydrothermal activity, where magmatic fluids are likely in greater supply, is essential to understanding the evolution of these hydrothermal systems. The ability of macro- and micro-fauna to colonize these new sites may rely on the evolutionary state of these volcanic-hydrothermal systems. A system rich in sulfurous acid may be a poor host to some forms of biological activity while a suitable one to others. As the system evolves the biologic assemblage is likely to shift to one closer to that observed at longer-lived systems.

Accomplishments

During the cruise (May 5-13, Apia to Apia) 7 dives of the *Jason-2* vehicle from the Woods Hole Oceanographic Institution (WHOI) were conducted (Figs 6 through 12). Within a little more than an hour of reaching the bottom at W. Mata on the first dive (J2-413) we came across an active eruption at 1205 m near the summit of the volcano, at a site we named Hades vent. The eruption was characterized by glowing molten lava, explosions, the creation of large amounts of volcanic sands and the active formation of pillow lavas. An additional 4 dives at W. Mata revealed much about current and past volcanic activity there. The final dive (420) revealed large magma bubbles, presumably from the expansion of vaporous water and other gases that were exsolved from the magma, and independent magmatic fluids and/or, entrained interstitial seawater. This was the first ever observation of active lava flows in the deep ocean which is significant because the vast majority of the earth's crust was formed at submarine volcanoes in the deep sea, and most of the volcanic eruptions on earth take place under the sea's surface. Thus, this is the first documentation of one of the most fundamental processes forming the earth's surface. We conducted five dives (413, 414, 417, 418, and 420) at W. Mata and during every dive an active eruption was observed. Samples of rocks, sands, microbes, fluids and microbiology were collected throughout the five dives. In addition to the *Jason-2* operations, the Monterey Bay Aquarium Research Institute (MBARI) Autonomous Underwater Vehicle (AUV) *D. Allan B.* conducted two operations and made high resolution maps of the volcano (Figs. 16, 17). Two small hydrophones were also deployed by *Jason-2* within 20-40 m of the eruption site (Fig. 4). These data will be used to compare the short-term magmatic degassing cycles at W. Mata and compare them to those recently quantified at the NW Rota-1 site (Chawick et al., 2008).

Two dives (415 and 416) were conducted at the NELSC. The first dive landed on the western side of a recent lava flow, suggesting that we had located, in part, the site of the recent eruptive activity. We named this eruption deposit the Puipui lava flow. However, aside from the fresh lava flows and volcanic debris, there was no evidence of new and/or enhanced hydrothermal activity along the ridge. A site of diffuse hydrothermal activity was identified prior to the cruise on dive video on loan from Nautilus Minerals (P. Crowhurst, pers. comm.). The site was relocated on an older lava flow to the north, and was sampled for fluids, micro- and macro-biology. Evidence at the time suggested that the northern terminus of the new flows was encountered by the end of this first NELSC dive, however subsequent analysis and discussion puts that observation in question. Between dives 415 and 416, the AUV surveyed the neovolcanic ridge and a CTD-tow-yo (Fig. 26) was conducted along the same

path over the eruption area as the tow-yo in November 2008 (that showed temperature anomalies as high as 0.5° C). The tow-yo revealed no major hydrothermal plumes in the area and no near-bottom temperature anomalies over the eruption site. Dive 416 was used to identify both the lateral extent and the southern terminus of the lava flows from the recent eruption. The absence of an extant hydrothermal system along this part of the ridge indicates either that the lava flow was quite small or that no eruption took place and the young lava flow observed was from a prior eruption. In any case, the apparent absence of a recently reset hydrothermal system precluded the study of the chemical and biological evolution following and eruption and greatly reduced its use as a comparison site for the East Lau Spreading Center ISS. Once the southern terminus of the lava flows was documented, the dive was moved several km to the south to visit a different NELSC hydrothermal system that had previously been located by Nautilus Minerals at Maka volcano. The hydrothermal vents at Maka were black smokers located on a large mound of sulfides, rich in biological activity. The site was sampled for biology, fluids, and sulfides, thus providing a relevant comparison to the East Lau Spreading center ISS. *[http://www.nautilusminerals.com/s/Media-NewsReleases.asp?ReportID=319379&_Type=News-Releases&_Title=Teck-Cominco-Discovers-Four-High-grade-Copper-Gold-Zinc-SMS-Systems-in-Tong]*

In addition to the *Jason-2* and AUV dives, the locations of some of the CTD tows and casts over the eruption sites were reoccupied to provide a time-series of the water-column anomalies (Fig. 24). Finally, a hydrophone mooring deployed in December 2008 as a response to the discoveries of the eruptions was recovered on the latter part of the cruise.

Funding and Participation

This project was funded jointly by the National Science Foundation (NSF) and the National Oceanographic and Atmospheric Administration (NOAA). Three days each of ship time were funded by NOAA-Ocean Exploration and NOAA-Pacific Marine Environmental Laboratory. NSF funded the remaining six ship days and 12 days of *Jason-2*. In addition, NOAA-OE funded the exploration budget for NOAA-PMEL and its Joint Institute Partners, Oregon State University and the University of Washington. NSF through the Ridge 2000, MARGINS, and core programs funded the scientific and support costs for the University of Washington, the University of Hawaii, the Monterey Bay Aquarium Research Institute (MBARI), Western Washington University, the Marine Biological Laboratory, and the Woods Hole Oceanographic Institution. Indirect funding (through UW for travel and analysis) also went or will go to Portland State University, Moss Landing Marine Labs, the University of Tulsa, Harvard University, and Pennsylvania State University. Samples were also collected for the University of California, Santa Cruz. Finally, MBARI (four participants) and PMEL (four federal scientists) provided funding for their scientists' salaries in addition to at-sea participation.

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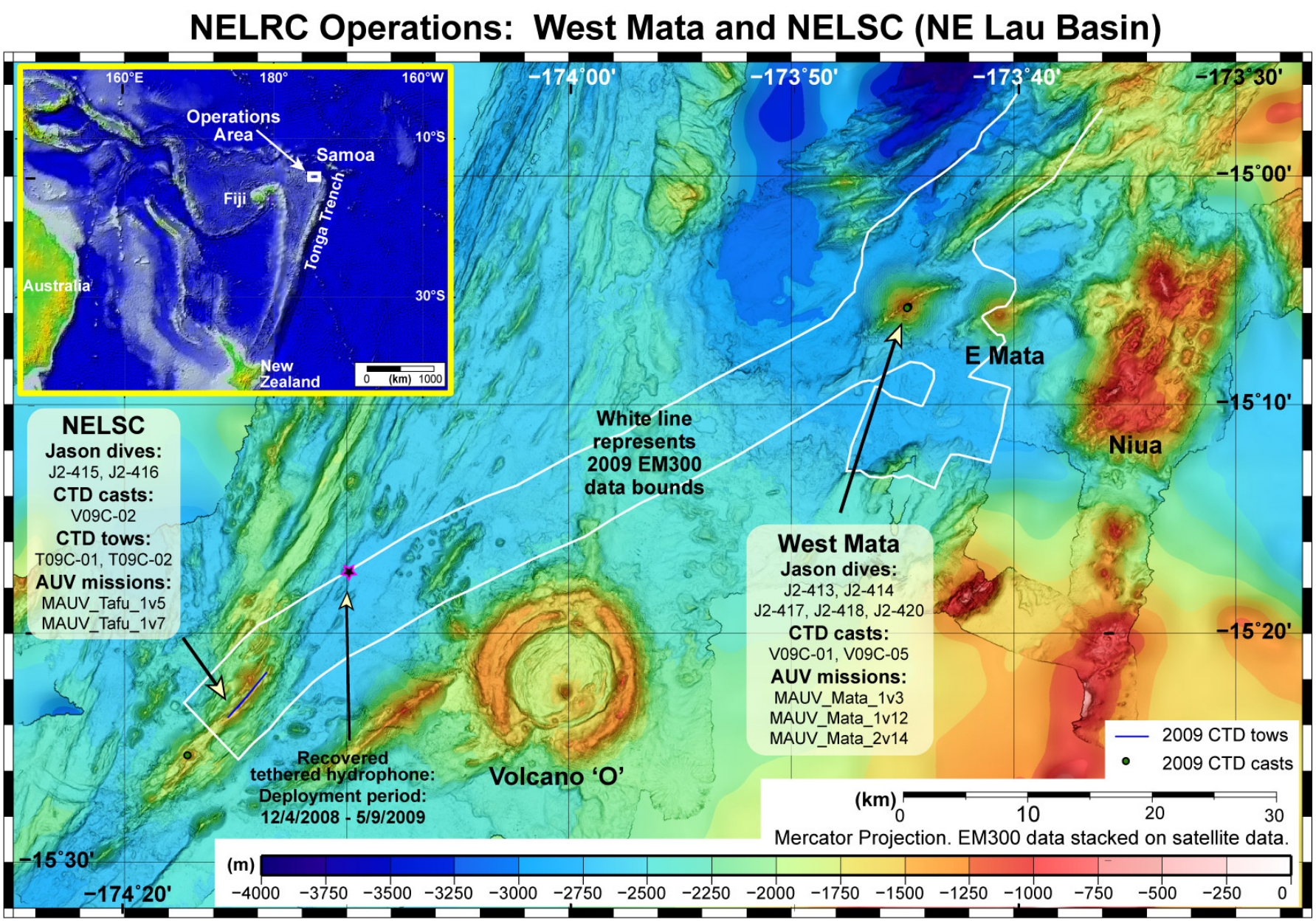


Figure 1. NELRC cruise location and operations.

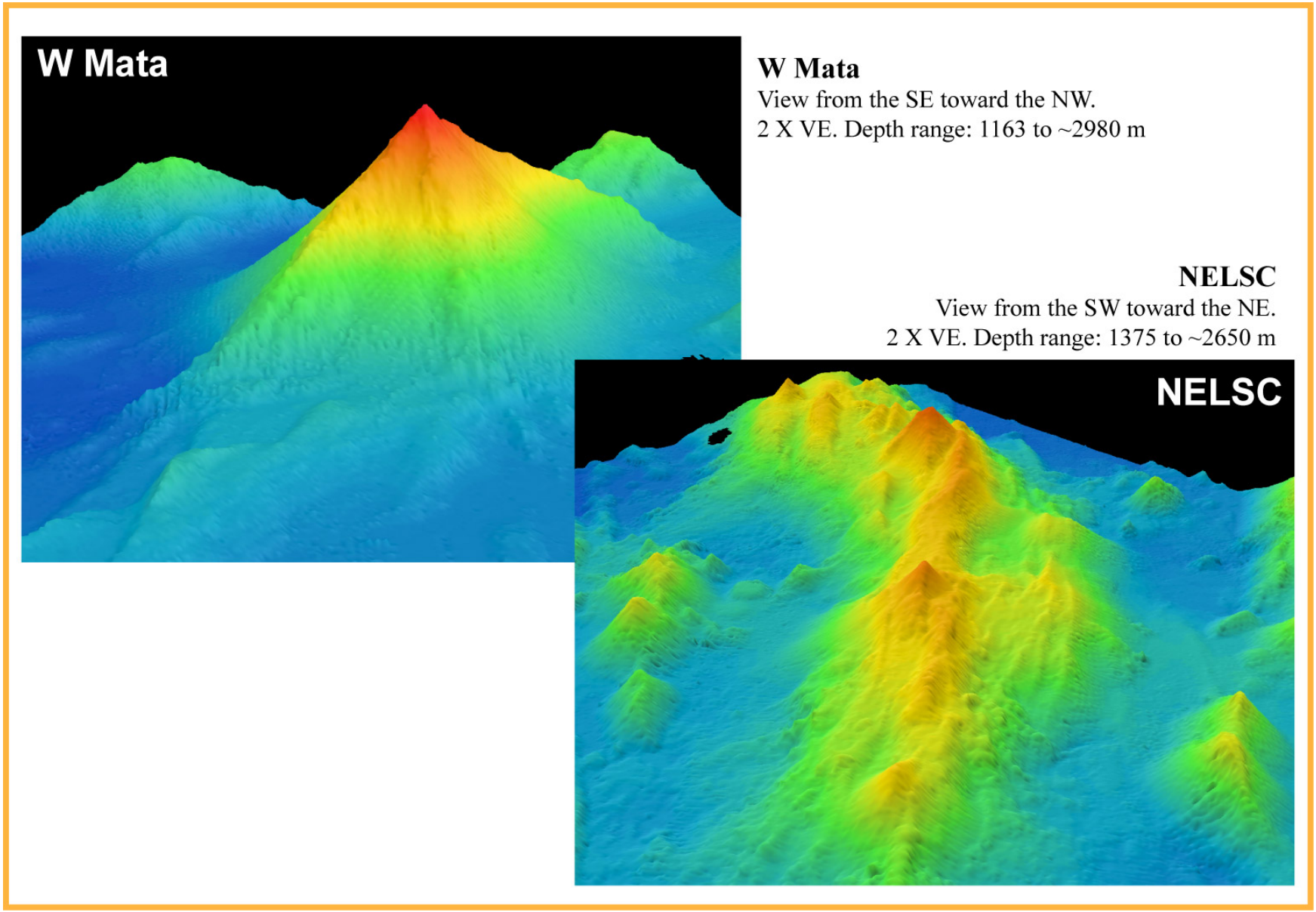


Figure 2. Three dimensional views of the cruise focus sites: West Mata and NELSC.

1.1 Operations Log

Date (local)	Time (local)	Date (UTC)	Time (UTC)	NELRC – TN232 Events	Latitude	Longitude
UTC is 11 hours ahead of local Samoan time						
5-May	0905	5-May	2005	Depart Apia Harbor. Samoa	-13.83333	-171.73333
5-May	0947	5-May		Turn EM300 on. Not logging because still in Samoan waters.		
5-May	1115	5-May	2215	Arrived at appropriate area for USBL calibration. Turned EM300 off to avoid interference.	-13.70324	-171.94922
5-May	1125	5-May	2225	Elevator in the water for USBL calibration. Z=528.		
5-May	1420	6-May	0120	Finished USBL calibration.		
5-May	1530	6-May	0230	Continuing on to West Mata. Finished up ship drills USBL calibration and recovering elevator.		
6-May	0015	6-May	1115	XBT (pre_E_Mata.asvp). Problems with that file so started out EM300 survey using "1500.asvp". Corrected that by applying a new CTD/Levitus combined table after collection.		
6-May	0030	6-May	1130	Start logging EM300 data (line 1). Trench to W. Mata. Started at this location because only had clearance to survey in Tongan waters.	-14.75733	-173.5005
6-May	0045	6-May	1145	Changed out sound velocity profile. E_Mata.EDF.asvp.		
6-May	0120	6-May	1220	Noticed that EM300 mode was set at "extra deep" so coverage is very narrow. Changed mode to "Auto" and beams opened up. Z=2110.		
6-May	0243	6-May	1343	Stop EM300 logging. At West Mata dive site for J2-413.		
6-May	0356	6-May	1456	*Jason* in the water. Start of dive **J2-413** at W Mata summit. Exploration.	-15.09418	-173.74988
6-May	1218	6-May	2318	*Jason* on deck. End of dive J2-413.		
6-May	1220	6-May	2320	EM300 logging for roll bias test. Surveying across W Mata.		
6-May	1355	7-May	0055	Stop EM300 logging (line 6).		
				CTD test. End at 0115 UTC.		
6-May	1508	7-May	0208	MBARI AUV *D. Allan B* in the water at W Mata. Mission **MAUV_Mata_1v3** (20090507Notes).	-15.07245	-173.69602
6-May	2008	7-May	0703	*Jason* in the water. Start of dive **J2-414** at W Mata summit.	-15.09387	-173.74708
7-May	0548	7-May	1848	AUV back on board. Mission aborted after 13.75 hrs. Failure due to INS reset at 942m during spin down. No bottom data.		
7-May	0802	7-May	1902	Jason on deck. End of dive J2-414.		
7-May	0828	7-May	1928	CTD vertical **V09C-01** (cast 1) start. W Mata. Cast successful.	-15.09428	-173.74852
7-May	0943	7-May	2043	V09C-01 end.		
7-May	1000	7-May	2100	Depart W Mata for NELSC.		
7-May	1010	7-May	2110	Start logging EM300 data (line 8).		
7-May	1248	7-May	2348	New EM300 survey over NELSC for surface differencing. EM300 line 10 (0010_20090507_234729).		
7-May	1324	8-May	0024	Stop EM300 logging. End of survey.		
7-May	1400	8-May	0100	MBARI AUV *D. Allan B* in the water at NELSC. Mission **MAUV_Tafu_1v5** (20090508Notes)	-15.40232	-174.2655
7-May	1545	8-May	0245	CTD tow **T09C-01** (cast 2) start. NELSC. South end of eruption area.	-15.39505	-173.25470
7-May	1726	8-May	0426	CTD T09C-01 end. Tow successful.	-15.37837	-173.23980
7-May	1815	8-May	0515	AUV back on board. Mission aborted due to INS reset again. No bottom data.		

Date (local)	Time (local)	Date (UTC)	Time (UTC)	NELRC – TN232 Events	Latitude	Longitude
7-May	1847	8-May	0547	*Jason* in the water. Start of dive **J2-415** at NELSC Nov'08 eruption site. Map young lava flow.	-15.39100	-174.25349
8-May	0807	8-May	1907	*Jason* on deck. End of dive J2-415.		
8-May	0837	8-May	1937	CTD tow **T09C-02** (cast 3) start. NELSC - continuing north along Nov'08 eruption area.	-15.38789	-174.24789
8-May	1053	8-May	2153	CTD T09C-02 end. Tow successful	-15.36210	-174.22637
8-May	1204	8-May	2304	CTD vertical **V09C-02** (cast 4) start. Maka volcano at the south end of NELSC.	-15.42315	-174.28493
8-May	1318	9-May	0018	CTD V09C-02 end. Cast successful		
8-May	1356	9-May	0056	MBARI AUV *D. Allan B* in the water at NELSC and Tafu (S end). Mission **MAUV_Tafu_1v7** (20090509Notes)	-15.40133	-174.26395
8-May	1611	9-May	0311	*Jason* in the water. Start of dive **J2-416** at NELSC south end of Nov'08 eruption site and Maka volcano at the southern end of the spreading center.	-15.38897	-174.25388
9-May	0817	9-May	1917	*Jason* on deck. End of dive J2-416.		
9-May	0915	9-May	2015	AUV back on board. Mission ~50% successful. Did collect bathymetry data.		
9-May	0930	9-May	2030	Start transit to recover hydrophone mooring (Northeast of NELSC).		
9-May	1045	9-May	2145	Arrive at **hydrophone mooring** location.	-15.28845	-174.15145
9-May	1445	10-May	0145	Hydrophone on board. Recovered.		
9-May	1802	10-May	0502	*Jason* in the water. Start of dive **J2-417** at W Mata. SW rift zone to the summit.	-15.09631	-173.75048
10-May	0803	10-May	1903	*Jason* on deck. End of dive J2-417.		
10-May	0843	10-May	1943	CTD vertical **V09C-03** (cast 5) start. Western base of W Mata. CTD failed at 1680m during downcast.	-15.10292	-173.77495
10-May	0914	10-May	2014	CTD V09C-03 end.		
10-May	1025	10-May	2125	CTD vertical **V09C-04** (cast 6) start. W Mata. CTD failed at 280m during downcast.	-15.09432	-173.74820
10-May	1032	10-May	2132	CTD V09C-04 end.		
10-May	1133	10-May	2233	Start logging EM300 data to fill the data gap SE of Mata.		
10-May	1248	10-May	2348	Stop EM300 logging. End of survey.		
10-May	1340	11-May	0040	MBARI AUV *D. Allan B* in the water at W Mata. Mission **MAUV_Mata_1v12** (20090511Notes)	-15.12328	-173.47604
10-May	1500	11-May	0200	CTD vertical attempt. Failed.		
10-May	1656	11-May	0356	*Jason* in the water. Start of dive **J2-418** at W Mata. NE rift zone to the summit.	-15.09418	-173.74988
11-May	0720	11-May	1820	AUV back on board. Mission was successful. Did collect bathymetry data.		
11-May	0755	11-May	1855	*Jason* on deck. End of dive J2-418.		
11-May	0903	11-May	2003	CTD tow attempt. Failed again (ground fault).		
11-May	1110	11-May	2210	CTD tow attempt again. Failed again.		
11-May	1457	12-May	0157	MBARI AUV *D. Allan B* in the water at W Mata. Mission **MAUV_Mata_2v14** (20090512Notes)	-15.12337	-173.76025
11-May	1800	12-May	0500	*Jason* in the water. Start of dive **J2-419** at W Mata. Exploration and documentation of eruptive processes.	-15.10341	-173.75564
11-May	2035	12-May	0735	*Jason* on deck. End of dive J2-419. Dive aborted due to fiber-optic power problems. Never got to bottom.		
11-May	2241	12-May	0941	*Jason* in the water. Start of dive **J2-420** at W Mata. Exploration and documentation of eruptive processes (same as previous aborted dive). **No HDTV video** due to fiber optic problem.	-15.10341	-173.75564
12-May	1020	12-May	2120	AUV back on board. Mission was successful. Did collect bathymetry data.		
12-May	1406	13-May	0106	*Jason* on deck. End of dive J2-420.		

Date (local)	Time (local)	Date (UTC)	Time (UTC)	NELRC – TN232 Events	Latitude	Longitude
12-May	1759	13-May	0459	CTD vertical **V09C-05** (cast 7) start. W Mata over Hades. Successful!!!	-15.09513	-173.74962
12-May	1857	13-May	0557	CTD V09C-03 end.		
12-May	1900	13-May	0600	Transit back to Apia Samoa.		
13-May	0900	13May	2000	Arrive in Apia Samoa. End of Cruise TN234.		

2.0 CRUISE PARTICIPANTS

PARTICIPATING ORGANIZATIONS

- JISAO/UW - Joint Institute for Science of the Atmosphere and Ocean/University of Washington (Seattle WA, USA)
- NOAA/PMEL - Pacific Marine Environmental Lab (Seattle WA and Newport OR)
- CIMRS/OSU - Cooperative Institute for Marine Resource Studies/Oregon State University (Newport, OR)
- JISAO/UW - Joint Institute for Science of the Atmosphere and Ocean/University of Washington (Seattle WA, USA)
- MBARI – Monterey Bay Aquarium Research Institute
- UH – SOEST University of Hawaii
- OHSU - Oregon Health & Science University, Division of Environmental & Molecular Systems
- MBL - Marine Biological Laboratory/ Woods Hole Oceanographic Institution (Woods Hole MA, USA)
- PSU – Portland State University (Portland, OR)
- Penn State - Penn State University (University Park, PA)
- WHOI - Woods Hole Oceanographic Institution (Woods Hole, MA)

SCIENTIFIC PARTY

Name	**Cruise Focus**	**Affiliation**	**Email Address**
Resing, Joseph	Chief Scientist trace element chemistry	UW	Joseph.Resing@noaa.gov
Embley, Robert	Co-Chief Scientist geophysics, volcanology	PMEL	Robert.W.Embley@noaa.gov
Baker, Edward	hydrothermal plume mapping	PMEL	Edward.Baker@noaa.gov
Baumberger, Tamara	magmatic volatiles	UW	tamara.baumberger@erdw.ethz.ch
Buck, Nathan	hydrothermal plume chemistry	UW	Nathan.Buck@noaa.gov
Butterfield, David	hydrothermal fluid chemistry	UW	David.A.Butterfield@noaa.gov
Caress, David	seafloor mapping, AUV	MBARI	caress@mbari.org
Clague, David	volcaniclastics, AUV	MBARI	clague@mbari.org
Conlin, Douglas	AUV engineer	MBARI	conlin@mbari.org
Cowen, James	organic and microbial geochemistry	UH	jcowen@soest.hawaii.edu
Davis, Rick	microbiology	OHSU	davisr@ebs.ogi.edu
Evans, Leigh	gas geochemistry	PMEL/OSU	Leigh.J.Evans@noaa.gov
Julie Huber	microbiology	MBL	jhuber@mbl.edu
Keller, Nicole	geology, sulfur isotopes	WHOI	nkeller@whoi.edu
Lilley, Marvin	magmatic volatiles	UW	lilley@u.washington.edu
Lupton, John	gas geochemistry	PMEL	John.E.Lupton@noaa.gov

Name	Cruise Focus	Affiliation	Email Address
Merle, Susan	geology, data management	PMEL/OSU	Susan.Merle@noaa.gov
Podowski, Liz	macrobiology	Penn State	elp145@psu.edu
Reysenbach, Anna-Louise	microbiology	PSU	reysenbacha@pdx.edu
Roe, Kevin	hydrothermal fluid chemistry	UW	Kevin.Roe@noaa.gov
Rubin, Ken	petrology, age-dating rocks	UH	krubin@hawaii.edu
Shank, Tim	macrobiology	WHOI	tshank@whoi.edu
Thomas, Hans	AUV engineer	MBARI	hthomas@mbari.org
Vailea, Akapei	Official government observer	Tonga	
Walker, Sharon	hydrothermal plume mapping	PMEL	Sharon.l.Walker@noaa.gov

NELRC – TN234 Scientific Party

JASON-2 OPERATING GROUP

WHOI- DSOG (Deep Submergence Operating Group)
Woods Hole Oceanographic Institution (Woods Hole MA, USA)

Name	**Role**
Collasius, Alberto "Tito" tcollasius@whoi.edu	*Jason-2* Expedition Leader
Agee, Casey	*Jason-2* Engineer
Handley, William	*Jason-2* Engineer
Hansen, Scott	*Jason-2* Engineer
Keith, Maryann	High Def TV
Kelley, Sean	*Jason-2* Engineer
Kevis-Stirling, Akel	*Jason-2* Navigation
Pelowski, James	*Jason-2* Data
Sellers, William	*Jason-2* Engineer
Walter,David	*Jason-2* Engineer

Jason-2 recovery

R/V *Thomas G THOMPSON* TEAM

Name	**Position**
Alan McClenaghan	Captain
Robert Symonds	Chief Mate
Eric Haroldson	2nd Mate
Ian Maury	3rd Mate
Brian Clampitt	AB
David Philbrick	AB
Dana Africa	AB
Robert Worrad	AB
Pamela Blusk	AB
Scott Moore	AB
Terry Anderson	Chief Engineer
James Swanton	1st Assistant Engineer
Todd Meeker	2nd Assistant Engineer
Andrew Bartell	3rd Assistant Engineer
Michael Henderson	Oiler
Michael Koch	Oiler
Mario Yordan	Oiler
Kimberly Gardner	Wiper
Dan McBriar	Chief Steward
Sean Lindenmuth	2nd Cook
Terence Singerline	Mess Attendant
Tony Burke	Scientific Marine Technician
Min Lin	Scientific Marine Technician
Ken Feldman	Scientific Marine Technician

The R/V *Thompson* deploying *Jason-2*

3.0 *JASON-2* DIVES NELRC – TN234

3.1 Statistics

Jason-2 Lowering Summaries (all times GMT)							
Lowering Id	**Start / Launch**	**Start Data**	**End Data**	**End / On Deck**	**Site**	**Btm Time Hrs:Mns**	**Wet Time Hrs:Mns**
J2-413	2009/05/06 14:56	2009/05/06 16:01	2009/05/06 22:27	2009/05/06 23:17	West Mata	06:26	08:21
USBL(labeled as LBL in DVLNAV data), Hi Def							
J2-414	2009/05/07 07:03	2009/05/07 08:01	2009/05/07 17:57	2009/05/07 19:01	West Mata	09:56	11:58
USBL(labeled as LBL in DVLNAV data), Hi Def							
J2-415	2009/05/08 05:47	2009/05/08 07:13	2009/05/08 18:00	2009/05/08 19:06	NELSC	10:47	13:19
USBL(labeled as LBL in DVLNAV data), Hi Def							
J2-416	2009/05/09 03:11	2009/05/09 04:20	2009/05/09 18:10	2009/05/09 19:16	NELSC	13:50	16:05
USBL(labeled as LBL in data), Hi Def							
J2-417	2009/05/10 05:01	2009/05/10 05:58	2009/05/10 17:57	2009/05/10 19:02	West Mata	11:59	14:01
USBL(labeled as LBL in DVLNAV data), Hi Def							
J2-418	2009/05/11 03:56	2009/05/11 05:00	2009/05/11 18:05	2009/05/11 18:55	West Mata	13:05	14:59
USBL(labeled as LBL in DVLNAV data), Hi Def							
J2-419	2009/05/12 05:00	-	-	2009/05/12 07:35	West Mata		
USBL(labeled as LBL in DVLNAV data), dive aborted, no bottom time							
J2-420	2009/05/12 09:41	2009/05/12 10:49	2009/05/13 00:04	2009/05/13 01:06	West Mata	13:15	15:25
USBL(labeled as LBL in DVLNAV data), Last lowering, Hi Def Camera not working							
Totals						79:18	94:08

3.2 Dive Areas: Maps of West Mata and NELSC Vent Sites *(Susan Merle)*

Refer to navigation section 4.0 for further information about vent and trackline positions.

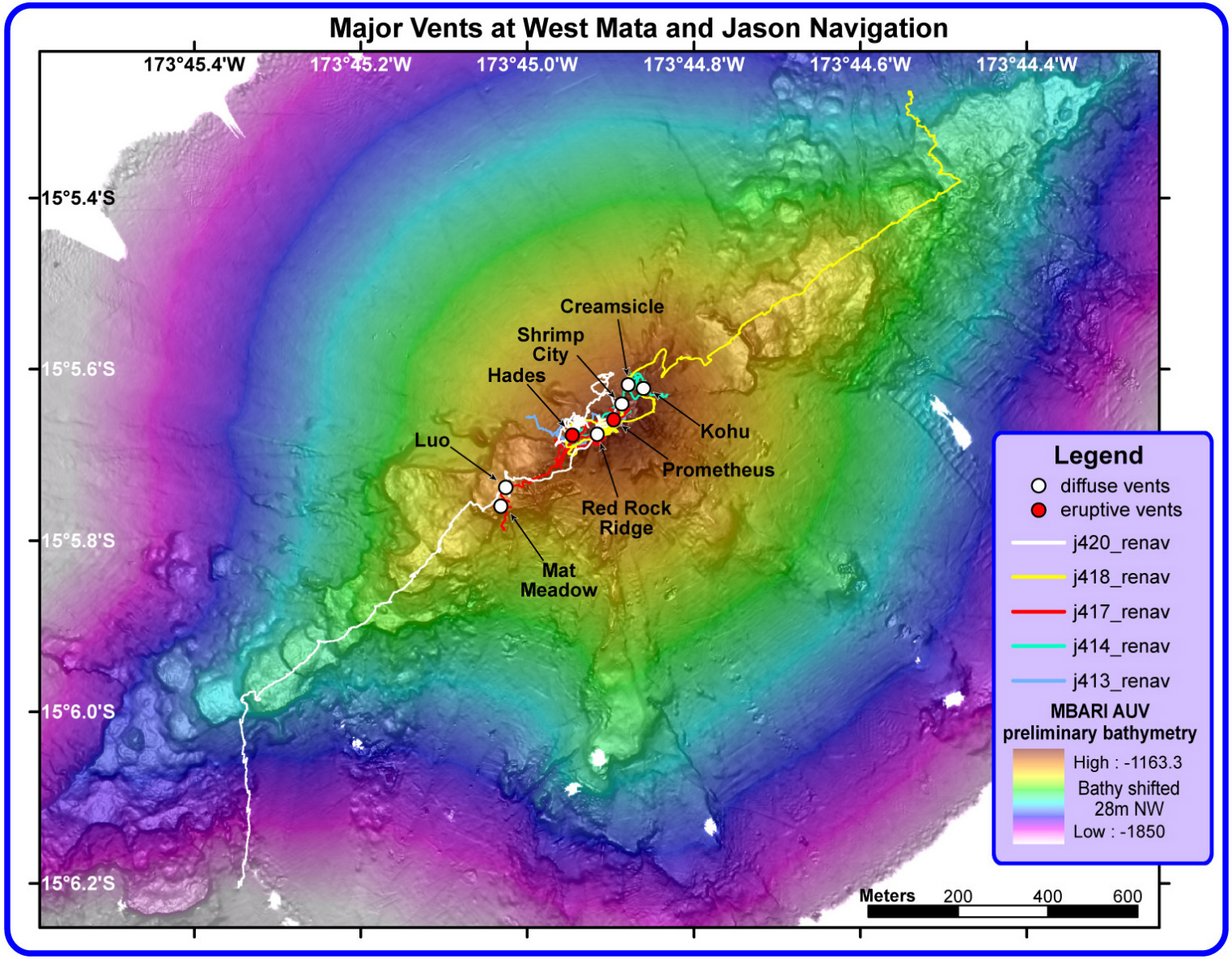
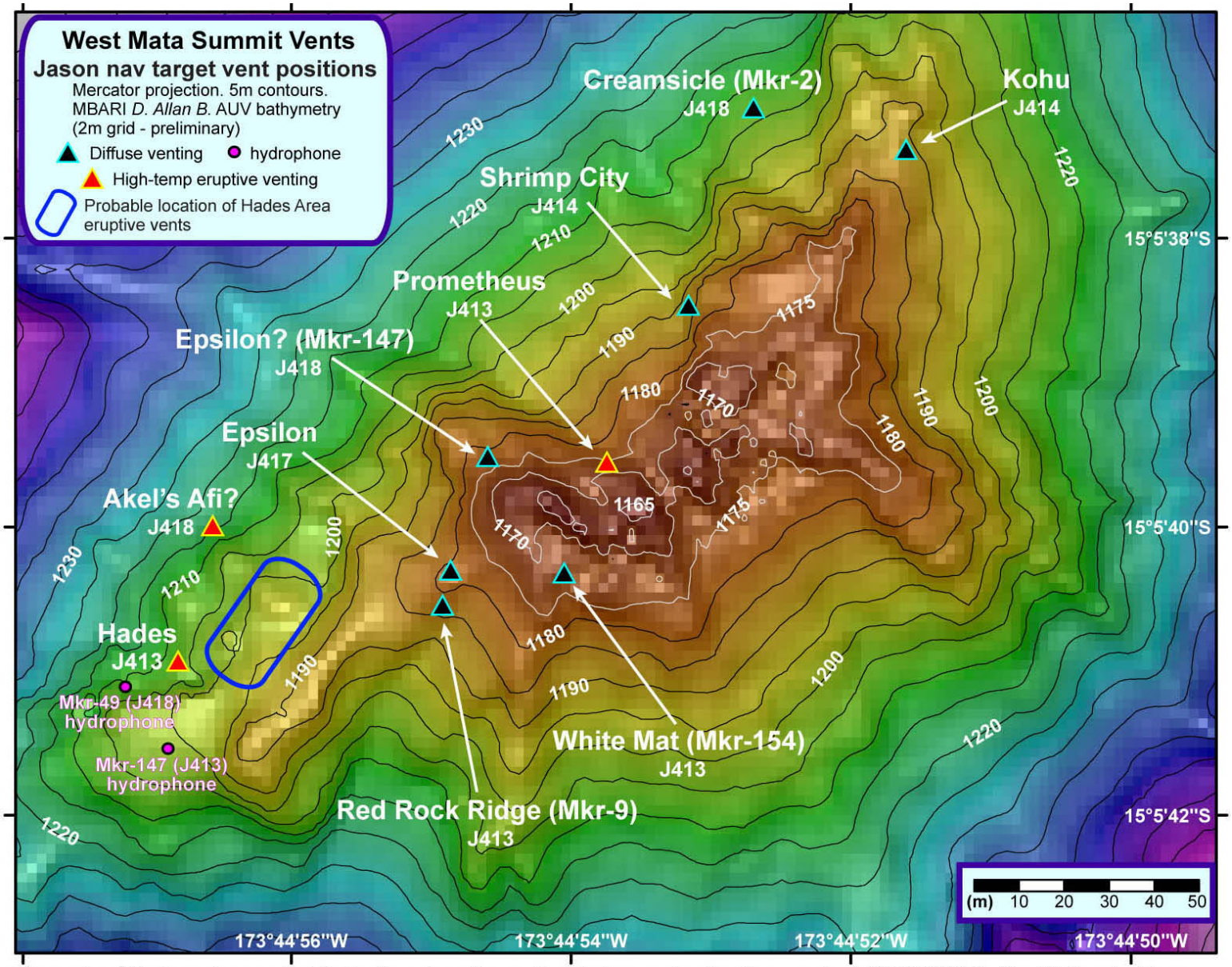


Figure 3. West Mata: major vent sites and all Jason navigation overlaid on preliminary AUV bathymetry.



Dive numbers following vent names reflect the dive the vent was discovered and the Jason nav target position was entered. MBARI AUV *D. Allan B.* bathymetry data are preliminary (2m resolution) and have been shifted (by Susan Merle) to agree with EM300 bathy and Jason dive tracks. AUV bathy shift: 28m to the NW (12m W and 25m N).

Figure 4. West Mata summit: All vent sites and markers overlaid on preliminary AUV bathymetry.

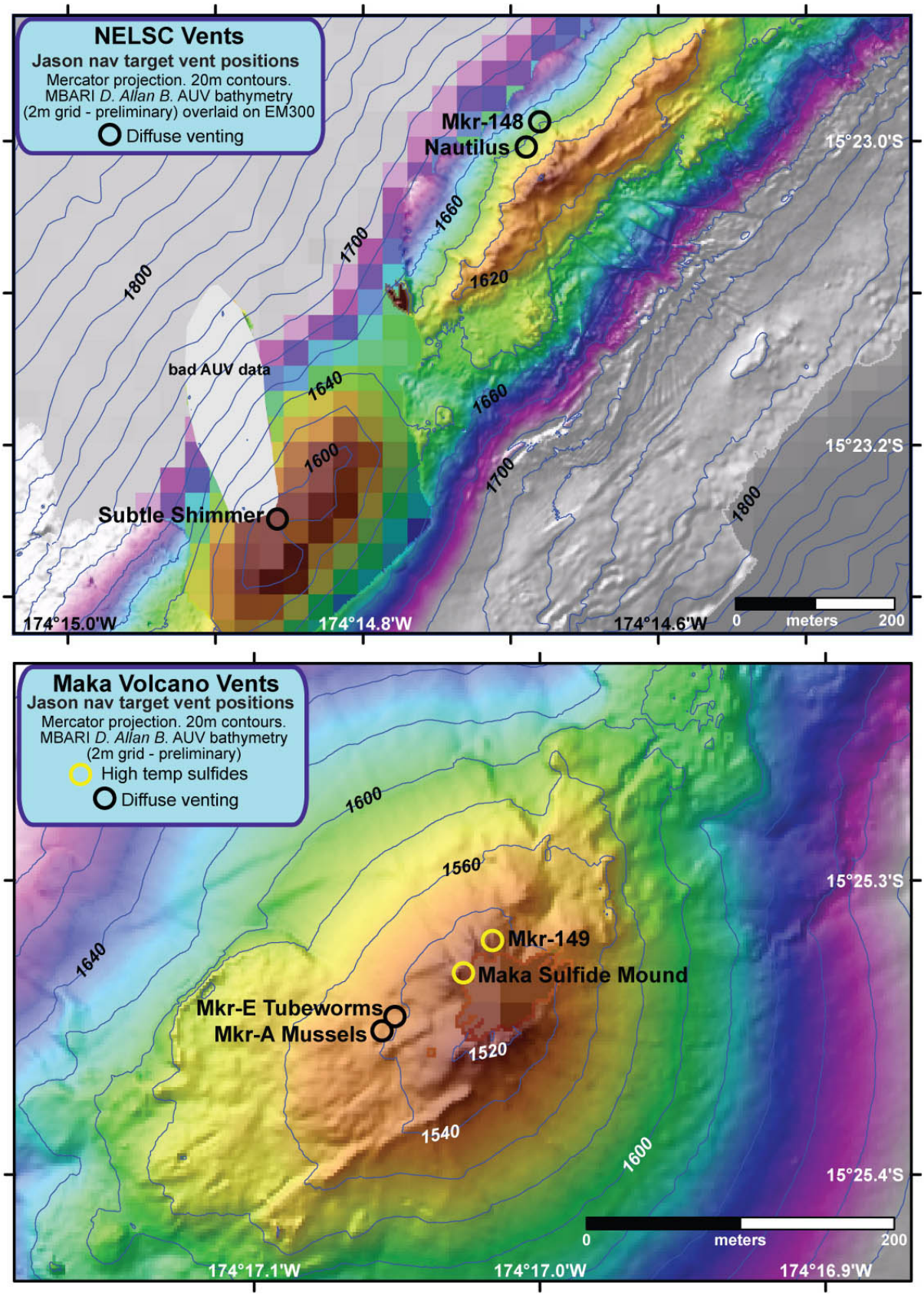


Figure 5. NELSC. All vent sites and markers overlaid on preliminary AUV bathymetry. top) Nov'09 probable eruption area. bottom) Maka volcano.

3.3 Dive Summaries

J413 Location: West Mata

NW flank of summit, Hades, summit, Red Rock Ridge, White Mat Mkr-154, Prometheus

Bottom time (UTC): 2009/05/06 16:01 - 2009/05/06 22:27 (06:26 total)

Sample information: 16 total. 4 biology, 3 fluid, 1 gas, 8 geology.

Tasks: First dive at West Mata for exploration. Climb to summit – from NW of summit. Then travel along the summit ridge crest from SW to the shallowest portion of the summit.

Dive Summary: On climb from NW of the summit toward the summit collected 3 rock samples. Eruptive activity was discovered about 1 hour into the dive (70 min on bottom). The first vent area (named **Hades**) is just north of the summit ridge at Jason depth of 1208m. During the dive visited Hades area twice. At/near Hades samples included: 2 rocks, 1 sed, 2 niskins. Continued along ridge to the NE suctioning sediments/mat at the "summit" then continued on, discovering 2 diffuse venting sites **Red Rock Ridge** and **White Mat Vent** (where we deployed Mkr-154). Suction sampled mat/seds at each of those diffuse vents. At the summit we discovered another eruptive vent, dubbed **Prometheus** – about 100m NE of Hades along the ridge crest. Jason depth for the vent is 1175m. Samples at Prometheus include: 1 bio sample of shrimp, 1 major, 1 gastight, 1 sed and 1 rock. Left the bottom to circle back and find a spot to deploy the hydrophone. When touched down again observed pillow lavas forming and flowing downslope on the seafloor below Hades. Next found a place to **deploy the B-Probe hydrophone (and Mkr-147)** at 1200m - about 20m SW of Hades. Spent the end of the dive observing Hades while the hydrophone was deployed.

J414 Location: West Mata

E/SE of ridge crest, Kohu, Shrimp City, Prometheus, SE of Shrimp City, Red Rock Ridge, Hades.

Bottom time (UTC): 2009/05/07 08:01 - 2009/05/07 17:57 (09:56 total)

Sample information: 30 total. 1 biology, 20 fluid, 4 gas, 5 geology.

Main goals: 1) Explore crest of West Mata and sample fluids (HFS), biology, geology. 2) Revisit Prometheus and Hades. 3) Revisit hydrophone location and possibly retrieve it.

Dive Summary: Started the dive SE of the ridge crest / summit. Collected 1 rock sample. Moved up slope to the ridge crest. Discovered area of diffuse venting and lots of smoke, called it **Kohu**. Samples at Kohu: 5 HFS, 1 gas. Continued on exploring to the NE of the summit along the ridge crest. Discovered "**Shrimp City**", an area of diffuse flow and lots of shrimp, north of summit high. Samples at Shrimp City: 3 HFS, 1 shrimp slurp, and 1 rock collected upslope (SE) of Shrimp City. Next moved on to **Prometheus** for more sampling and observations. Samples at Prometheus: 6 HFS, 3 gas, 1 rock. Headed NE along the ridge a bit for more exploration. Saw extensive bacterial mat and shrimp along ridge crest. 1 sediment sample **(NE of Prometheus / SE of Shrimp City).** Climbed to the top of the summit (Z=1160) then headed over to Red Rock Ridge for more sampling. Samples at **Red Rock Ridg**e: 3 HFS, 1 rock. After leaving Red Rock Ridge on the way to Hades took 1 HFS sample for background water. Arrived at **Hades** for ~40 minutes of observation while the hydrophone is still deployed. Next went to **recover the B-Probe hydrophone (at Mkr-147)** - ~20m S/SW of Hades. Back to **Hades** for brief amount of time at end of the dive. Samples at Hades: 2 niskins above the plume.

J415 Location: NELSC

Bottom time (UTC): 2009/05/08 07:13 - 2009/05/08 18:00 (10:47 total)

Sample information: 20 total. 6 biology, 2 fluid, 1 gas, 11 geology.

Main goals: 1) Sample lava flows and hydrothermal vents along the ridge crest of NELSC. 2) Document eruptive processes.

Climb upslope SE to the southern end of the temperature anomaly zone identified on the Nov'08 cruise. Then head NE along the ridge crest, investigating the temperature anomaly position identified on the Nov'08 cruise. Find fresh lava flows and vents. Sample and deploy markers.

Dive Summary: Begin dive at 1280m on the NW side of the spreading center, climbing up the western side of the slope to the ridge crest. 1 rock sample at the landing site appears to be zero age so probably in the area of the

November eruption. Collected 3 more geology samples on the way upslope to the ridge crest. 2 are suspected to be zero age and one is not. When Jason reached the ridge crest it changed course and traveled along the ridge toward the "max temp anomaly" in search of venting and to study the new and old lava flows. Observed quite a lot of biology on the older lava flows (stalked crinoids, corals, sponges, seastars, non-vent fish). As expected, saw very little to no biology on the young lava flows. Passed over contacts between old and new lavas along the ridge crest. Went to the Nov'08 temp anomaly position and didn't find any signs of venting, but lots of young, black lavas all around. Observed "curtain-folded lavas" on the edge of the lobate flow. Climbed to the summit top (had been just north of it) and didn't see any venting but did see bacterial mat (probably dead) and new lavas. Saw very weak flow at the top of the northern ridge high. Dubbed it **"Subtle Shimmer"** - ~ 2° above ambient. The high point on this ridge looks to be older lavas. Lots of collapse pits observed during the traverse. Came upon an area at the ridge crest where the young lava flow was trapped between 2 ridges in a saddle. Collapse pits there show that the lava lake had to have been ~3m deep. On the ridge crest while heading Nautilus vent area sampled 4 more rocks and 1 sediment scoop. Found **Nautilus vent area**. Diffuse venting and amazing number and variety of biota including: crabs, squat lobsters, shrimp, gastropods, mussels, etc. This was the largest assemblage of biota witnessed on this expedition. Samples at Nautilus vent area: 6 multi-bio, 2 majors, 1GTB, 2 rocks. Continued north mapping the contact of young lavas but did not reach the northern end of the young eruption.

J416 Location: NELSC

Bottom time (UTC) 2009/05/09 04:20 - 2009/05/09 18:10 (13:50) total dive time near bottom. Transit from northern spreading center to Maka summit took ~3.5 hours so actual bottom time was: ~10hrs:20min.
Sample information: 23 total but 2 were not successful. 3 biology (macro), 4 fluid, 4 gas, 12 geology.
Main goals: Map and sample lava flows and hydrothermal vents along the ridge crest. Fluid and biology sampling at Maka (southern ridge high). 1) Take push core if find sediment pocket. 2) Map fresh lava flows and hydrothermal vents along track line. 3) Collect rocks, sands, core, and biology. 4) Find vents and conduct sampling.
Dive summary: Started at 1800m on the sediments and old lava downslope of the ridge on the NW side and climbed SE up to ridge crest. On the way upslope collected several samples: 5 geology (4 sed, 1 rock). Slope was covered with sediments and debris at landing site. As continued upslope tried to determine the age of the lavas and amount of sediment cover. Lots of rubble and debris. At 1680m crossed a contact from old to new lavas – curtain-folded sheet flows mainly. Approache the ridge crest on the NW side and turned to travel SW along the ridge to map new lava extent. Samples on that traverse: 2 geology (1 sed and 1 rock from the old flow). After 3+ hours at the spreading center, where we mapped the southern end of the new lava flow and collected 8 samples, we then decided to travel through the water column 4.5 km to Maka vent on the small volcano on the southern ridge. Transit took 3.5 hours. Landed on the southern side of the cone and traveled upslope toward the summit sulfide area. Found active sulfide chimneys and vent biota. Samples at Maka: 4 geology (3sulfides, 1 rock), 4 fluid (majors), 4 gas (GTB), 2 biology (tubeworms and mussels). Measured temperatures >300C at sulfide chimneys. Quite a lot of biology around the chimneys as well. This is the only area we found sulfides on the cruise.

J417 Location: West Mata

S of SW summit ridge, Mat meadow, Luo, SW of Hades on ridge crest, Epsilon, Prometheus, Hades.
Bottom time (UTC) 2009/05/10 05:58 - 2009/05/10 17:57 (11:59 total)
Sample information: 28 total. 2 biology (mat), 22 fluid, 4 geology.
Tasks: 1) Vent fluid sampling of Mata vents and rock sampling of rift zone. 2) Geologic traverse from SW of ridge crest, up the slope, then follow the ridge crest SW to the summit and sample fluids at vents. 3) Opportunistic rock and biology sampling. 4) Document the eruption processes
Dive summary: Began dive **SW of the ridge crest** (~1325 meters depth). Collected rock samples while heading upslope, then discovered a large area of diffuse venting with an extensive field – a few hundred square meters - of mat (mostly white but some red too) and volcaniclastic sediments on the top of a pillow flow. Temp in the sediments >25°C. Dubbed the area "**Mat Meadow**". Collected 2 biology (mat) samples. Continued up slope to near the ridge crest (SW of summit). Discovered another area of intense diffuse venting pouring out of a pit > 1

m across. Named the vent "**Luo**", which means "hole or pit" in Tongan. Samples at Luo: 4 HFS. Continued on toward Red Rock Ridge but got lost in the plume and ended up ~10m north of there in an area of "epsilon" white mat and extensive flow. Named the vent site "**Epsilon**" for the probable epsilon proteobacteria dominating the site. Samples at Epsilon: 4 HFS. Next tried to find the marker at Red Rock Ridge but were unsuccessful, so decided to proceed to Prometheus. At **Prometheus** attempted to sample within the plume but had to back off due to tephra raining out of the plume and zero visibility. Took a background HFS sample (~10m W/SW of Prometheus) then went back to the vent to try to sample again. More tephra, etc. raining down on the vehicle. Samples above the plume at Prometheus: 4 HFS. After sampling, backed off from the vent and headed to **Hades**. Outside of the plume at Hades, **removed added weight of the tephra/fragments/rocks etc. accumulated while sampling at Prometheus. 80 pounds of material accumulated on Jason during HFS sampling. 60 pounds removed.** While cleaning the basket took a background HFS sample. At Hades sampled: 4 HFS and 2 GTB and 2 niskins in plume above vent. Observations at Hades. The last sample (J417-tephra-28) is all the material remaining on the ROV from the explosive eruptions at Prometheus and Hades.

J418 Location: West Mata

S of SW summit ridge, Mat meadow, Luo, SW of Hades on ridge crest, Epsilon, Prometheus, Hades.
Bottom time (UTC) 2009/05/11 05:00 - 2009/05/11 18:05 (13:05 total)
Sample information: 33 total. 2 biology (macro), 18 fluid, 2 gas, 11 geology.
Tasks: 1) Travel up the NE rift zone sampling rocks, fluid and biology. 2) Deploy hydrophone near Hades. 3) Observations of eruptive processes
Dive summary: Started the dive **~1km NE of the summit, on the northern side of the rift zone at 1560m depth**. 1 rock sample at the landing site. Traveled up slope to the **summit rift**, collecting 1 coral sample. When reached the **ridge crest** collected and 1 sediment and 1 rock sample. Once at the ridge crest travelled to the west along the rift zone. Samples: 2 rock, 1 sed. Discovered new area of diffuse venting ~30m west of Kofu. Lots of orange and white mat/staining in the area so named the vent site **Creamsicle**. Samples at Creamsicle: 3 HFS. Next traveled over the summit crest to the south side. Collected 1 rock on the south side near the summit. The rocks appeared older on the south side and not much venting to speak of. After a small excursion on the south side searching for Red Rock Ridge, decided to head to **Hades** and deploy the hydrophone. **Deployed the LARa hydrophone and Mkr-49 within site of Hades**. After deploying the hydrophone went back to Hades for observations and sampling. Samples at **Hades**: 4HFS, 2GTB. When departing Hades saw another large pulsing vent, also flaming at times. Dubbed the vent **Akel's Afi** (Akel discovered it and "Afi" is Tongan for "fire"). The navigator seemed sure that it was not Hades and not Prometheus. The navigation (renav – doppler and USBL combined) positions it ~20m NE of the samples at Hades, but there is a nav note that states it could be another 20m east of that position. If that is the case it's about half way between Hades and Prometheus (Z=1197m). While on the way to Red Rock Ridge the ship was blown off position. Spent about a half hour adjusting (off the bottom). Then made our way to Red Rock Ridge. The position on this dive is about 25m NE of the original position on dive J413 (which Akel thinks is more accurate). **Deployed Mkr-9 on top of rocks at Red Rock Ridge**. Samples at Red Rock Ridge: 5 HFS. Next moved on to find shrimp to sample. **Deployed Marker-147 at Epsilon**. The marker location is ~25m N/NE of the vent location recorded on dive J416. Continued toward Shrimp City to sample shrimp. Found the **Shrimp City Area**, but not sure we were directly at the vent. This sampling spot is ~10m E/SE of the Shrimp City target. Sample at Shrimp City Area: 1 shrimp suction, 2 HFS. HFS sample was taken for background on the way to the surface.

J419 Location: West Mata

Dive aborted near bottom due to electrical problems. No bottom time.

J420 Location: West Mata

S flank, SW ridge, Mat Meadow, Luo, Epsilon, Hades area
Bottom time (UTC) 2009/05/12 10:49 - 2009/05/13 00:04 (13:15 total)
Sample information: 23 total. 4 biology (1 shrimp, 3 mat), 2 fluid, 1 gas, 16 geology.
Note: The HDTV was not working on this dive due to fiber-optic problem

Tasks: The main goal of the dive was exploration and documentation of eruptive processes. Other goals were: 1) Travel up the SW rift zone sampling rocks. sediment, and biology, working toward the summit. 2) Recover the LARa hydrophone.

Dive summary: Started the dive ~1km SW of the summit at 1850m on the **south flank of the volcano**. Collected rocks while **climbing upslope toward the SW ridge crest** and more at the **SW ridge crest** before heading to the NE up the rift zone. Climbed over terrace scarps and several different lava flows, mostly pillows but also sheet and jumbled flows. Collected 13 geology samples before reaching Mat Meadow. At **Mat Meadow** scooped up white bacterial mat and sediments. Continued on to **Luo** Vent. At Luo we suctioned up shrimp near a rock ledge at the top of the pit. [Note: Mat Meadow and Luo positions are ~30-40m north of where they were on dive J417]. Continued on to **Epsilon Mkr-147** – after a bit of wandering around trying to find it. The Mkr-147 position from dive J418 agrees well with J420 nav, but the position of Epsilon (J417) is ~30m to the south. 2 suction samples of white filamentous mat taken at Epsilon Mkr-147. Traveled on to **White Mat vent Mkr-154** to sample shrimp, but only saw one shrimp so didn't bother. [Note: Mkr-154 position from dive J413 is ~25m S/SW of the nav on this dive. Nav puts it right next to the J413 Prometheus position – definite nav offsets from dive to dive]. Moved on to **Prometheus** to observe the eruptive activity there. Looked for active pillow formation around Prometheus but didn't see that happening. Prometheus was mainly producing fine-grained ash but not much explosive activity. **Moved on to what we believed was "Akel's Afi", but turned out to be Hades area all along. Recorded beautiful "smoke rings" riding from Hades on the Medea camera.** There were at least 2 active vents in the area, probably 3. One of those could have been what was named Akel's Afi on another dive. **The consensus is to just name the whole venting area "Hades Area", since it is so dynamic and ever-changing.** Observed pillow lavas forming and flowing downslope, molten rock and lots of ejecta from the vent. Very explosive activity from Hades. Samples at Hades area: 2 majors (for water-rock reactions over flowing pillow), 1 GTB (same place), **1 molten lava sample taken by pusing a titanium rod into an active pillow flow.**

3.4 Dive Maps *(Susan Merle)* Refer to navigation section 4.0 for further information about vent and trackline positions.

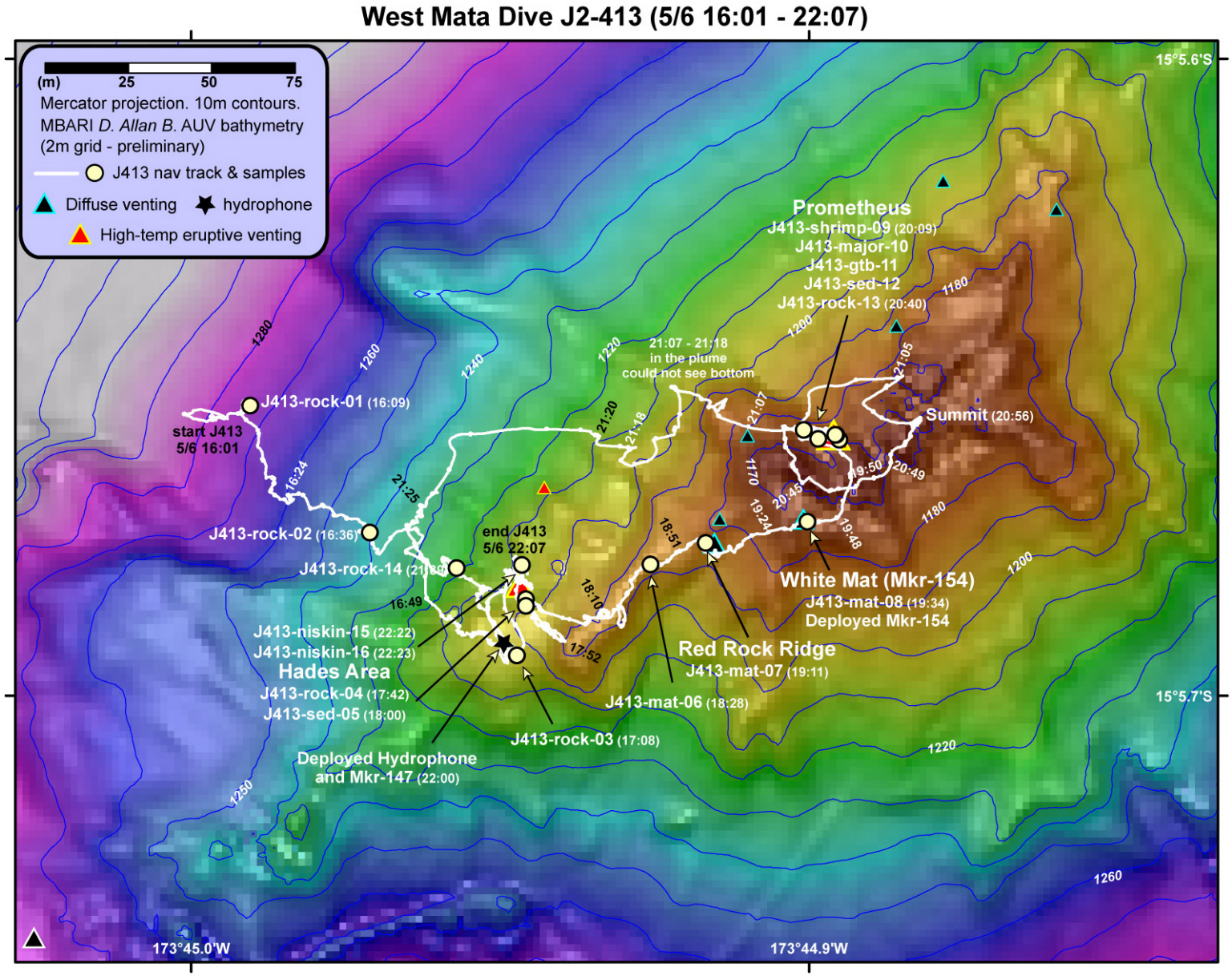


Figure 6. J2-413 Jason dive track overlaid on preliminary AUV bathymetry. Vents visited and samples taken are noted.

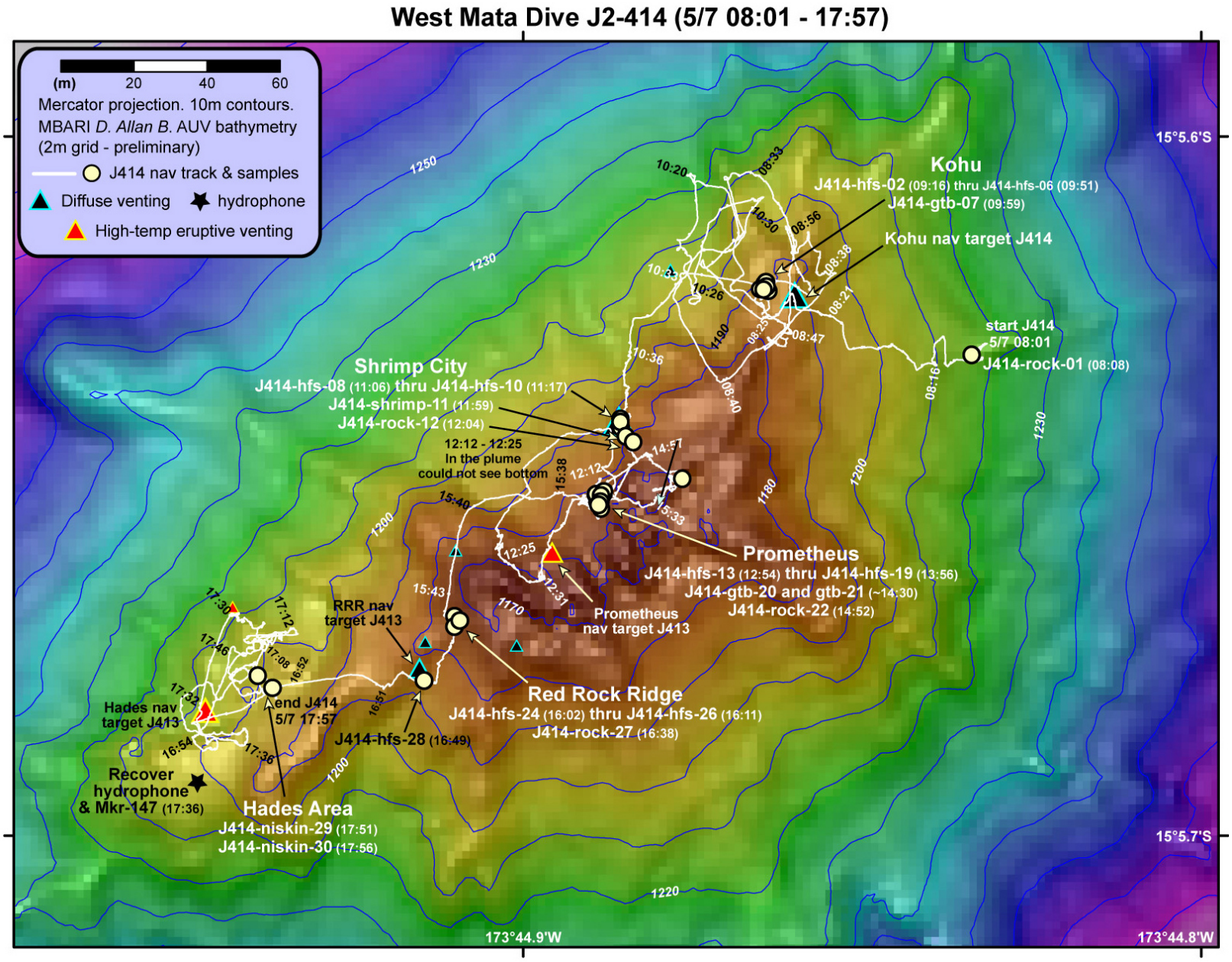


Figure 7. J2-414 Jason dive track overlaid on preliminary AUV bathymetry. Vents visited and samples taken are noted.

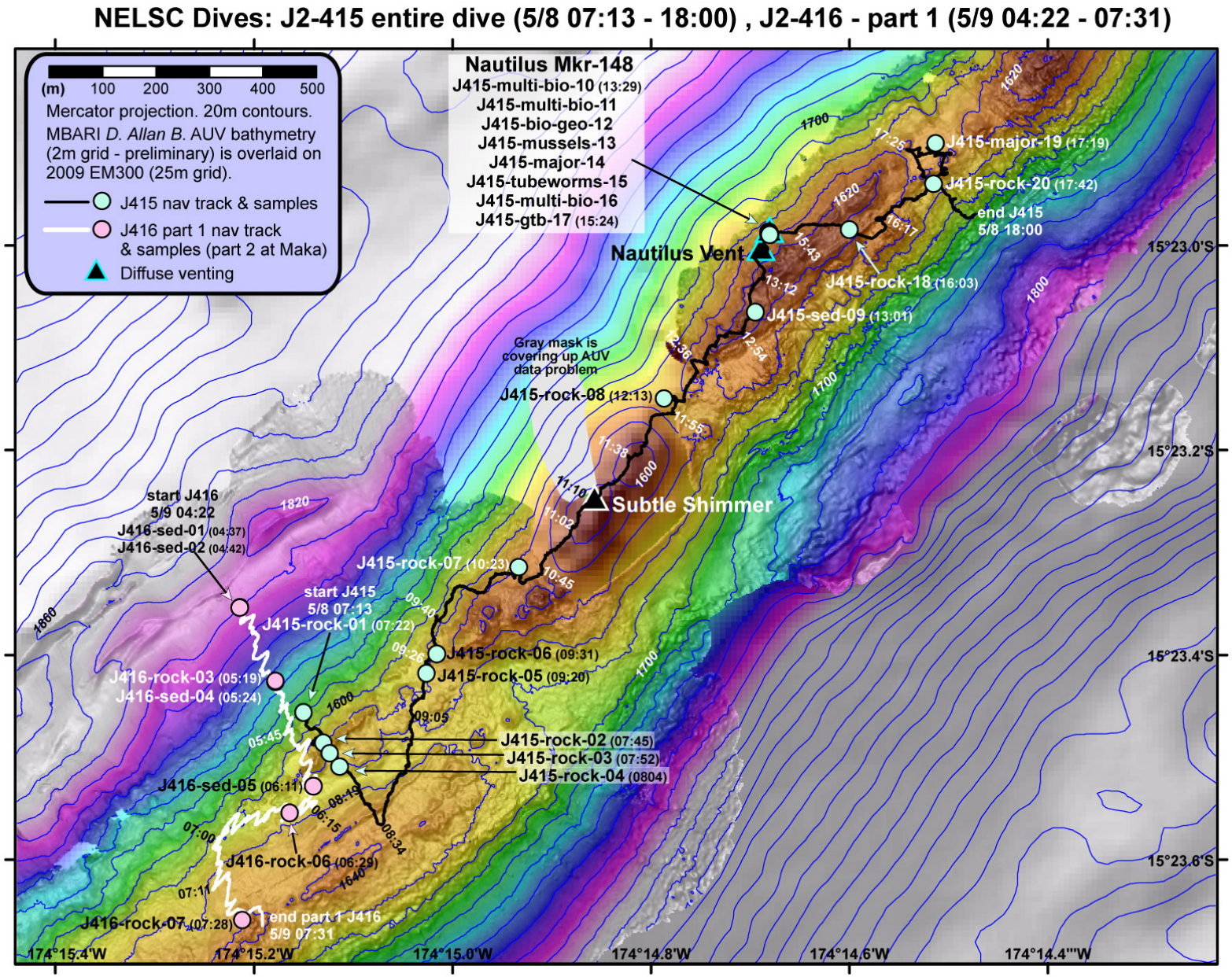


Figure 8. J2-415 and J2-416 part 1. Jason dive track overlaid on preliminary AUV bathymetry. Vents visited and samples taken are noted.

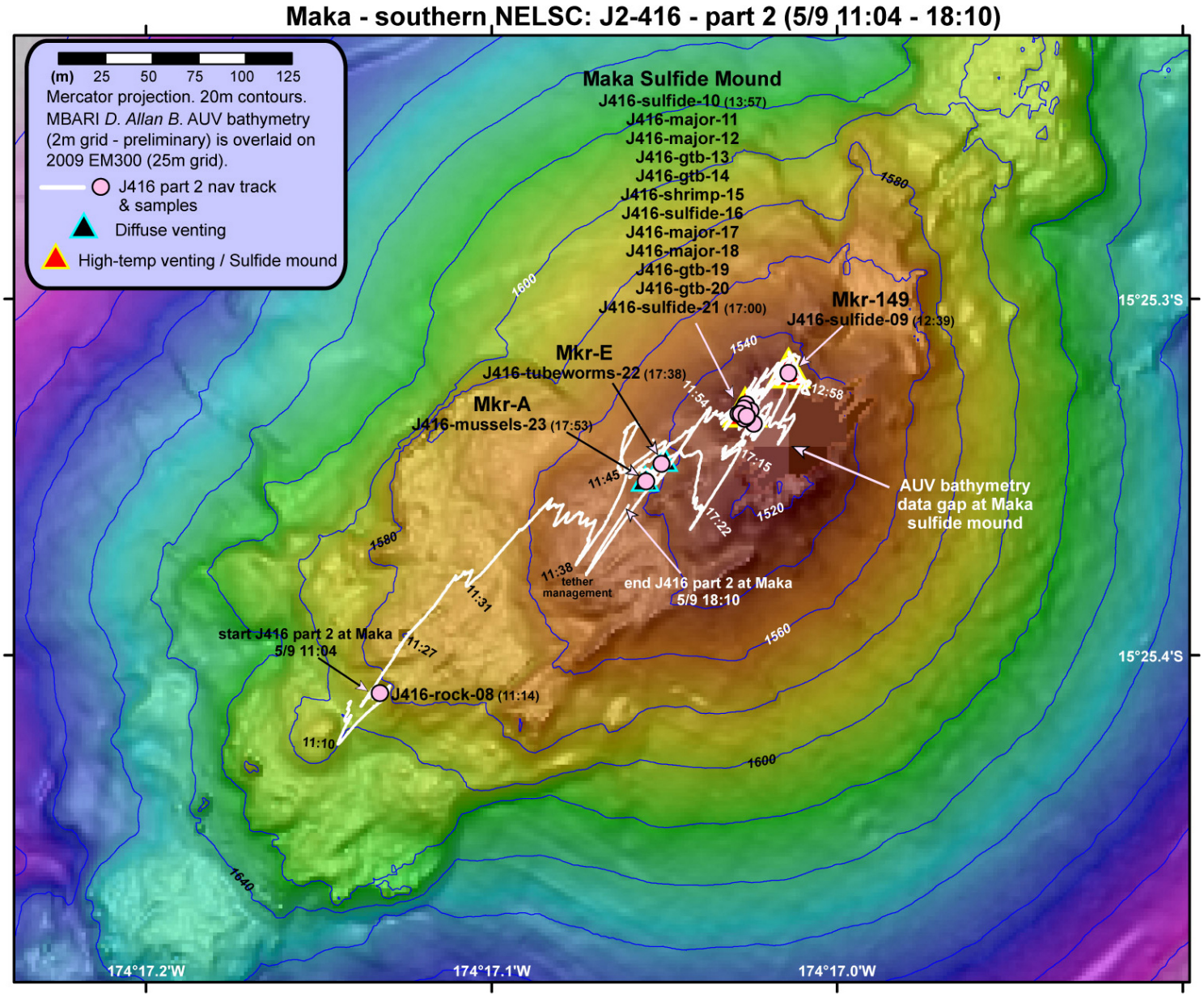


Figure 9. J2-416 part 2. Jason dive track overlaid on preliminary AUV bathymetry. Vents visited and samples taken are noted.

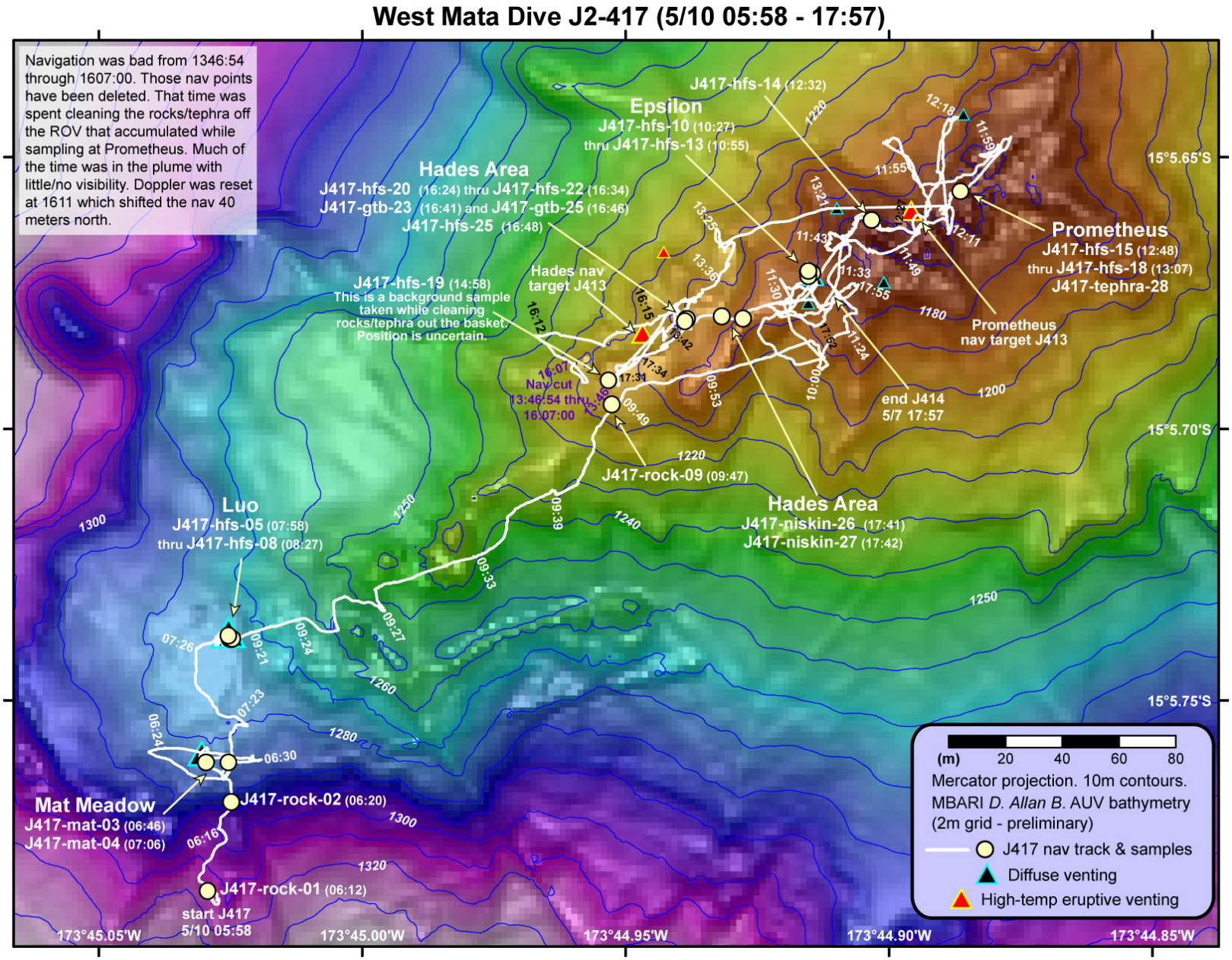


Figure 10. J2-417 Jason dive track overlaid on preliminary AUV bathymetry. Vents visited and samples taken are noted.

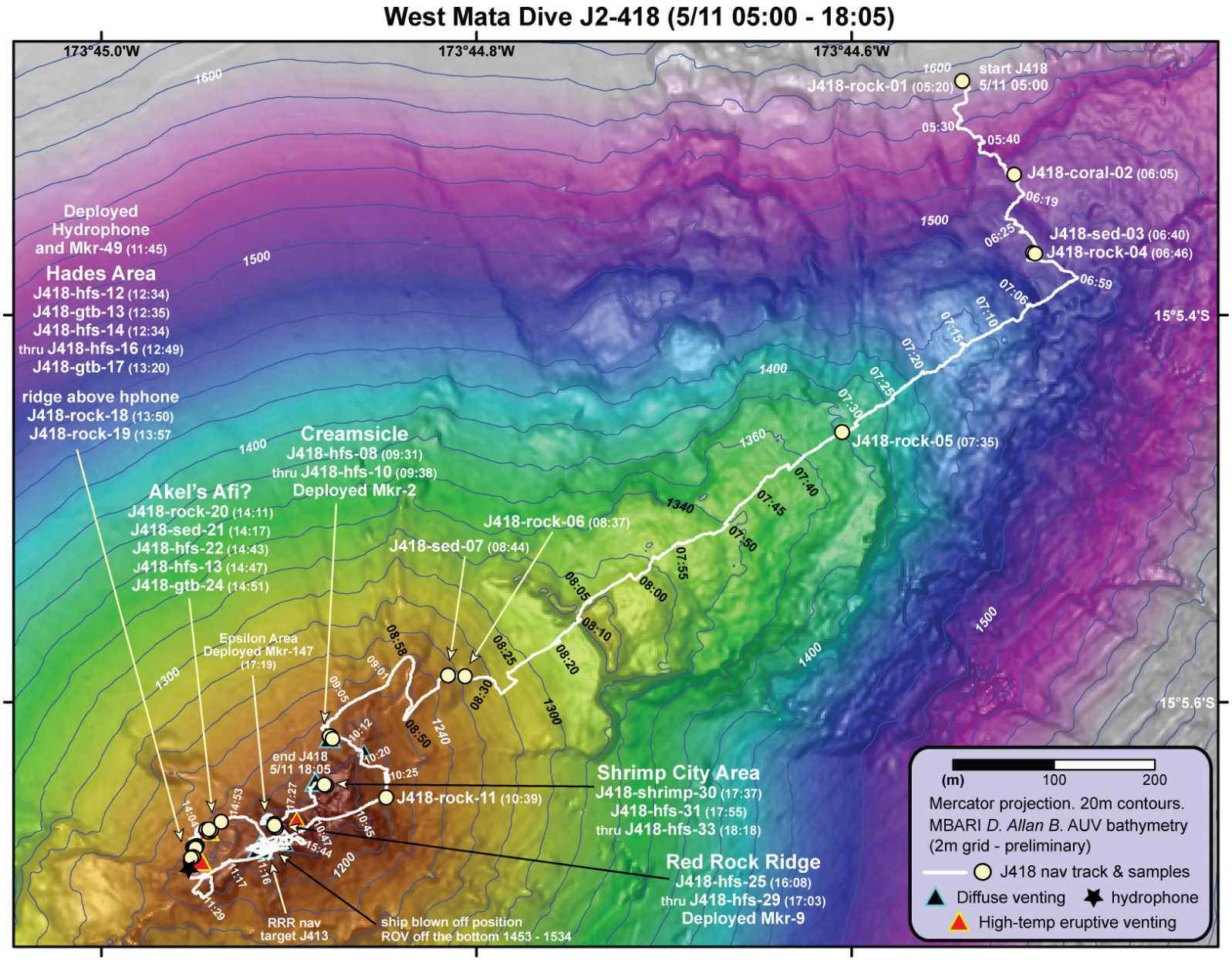


Figure 11. J2-418 Jason dive track overlaid on preliminary AUV bathymetry. Vents visited and samples taken are noted.

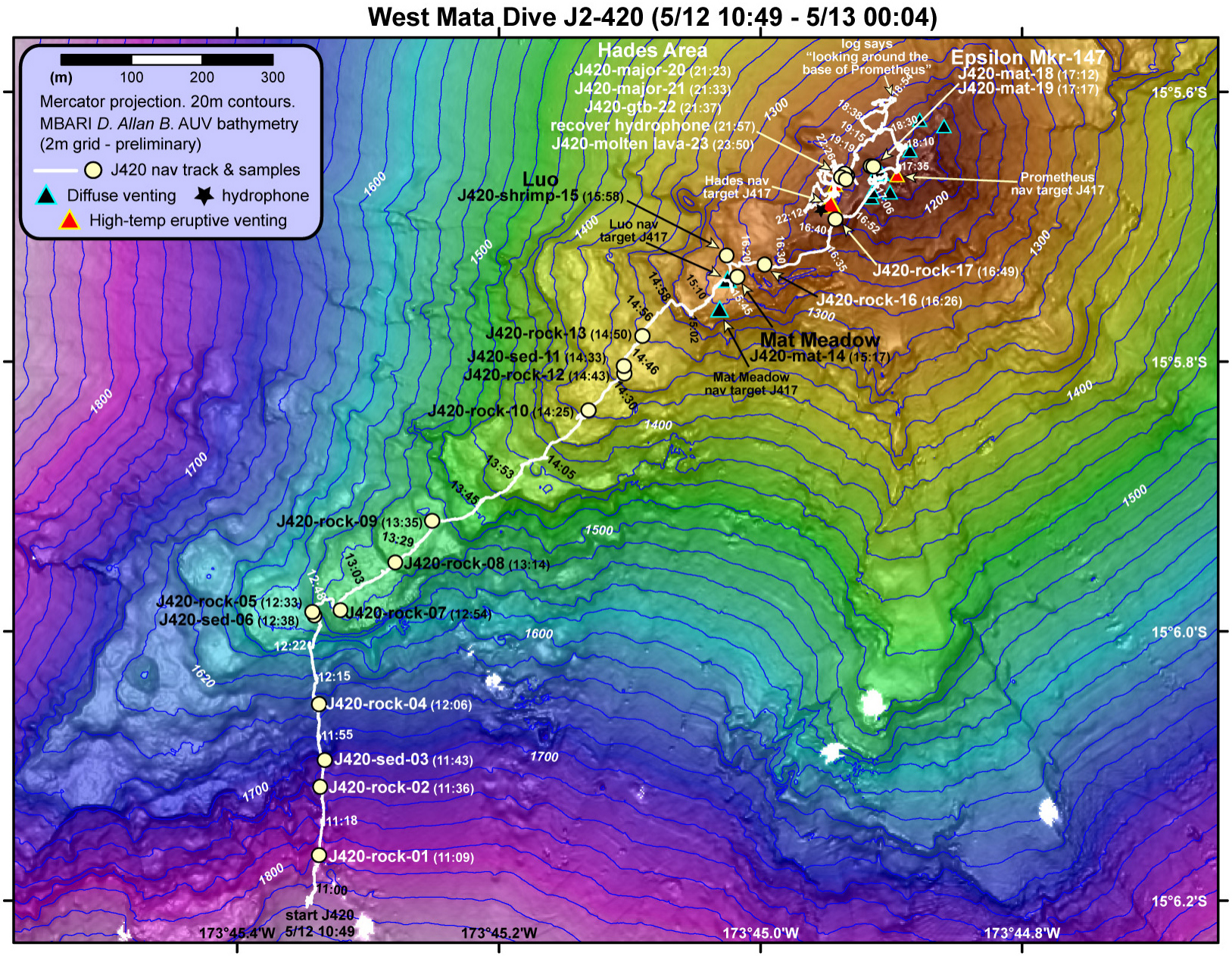


Figure 12. J2-420 Jason dive track overlaid on preliminary AUV bathymetry. Vents visited and samples taken are noted.

3.5 *Jason-2* Dive Samples

3.5.1 Sample Summary

Sample Type	Expected Derived Data Products	Device Type	Investigator(s)	Sample PI ID
Biology (22 samples)	Species Identification (macro and micro)	Manipulator, suction sampler, sediment scoops, Davis sampler	Macrobiology: Shank, Podowski for Fischer. Microbiology: Huber, Davis, Cowen, Reysenbach.	bio group
Geology (68 samples)	Geochemistry - volcanology	Manipulator, sediment scoops	Rubin, Clague, Embley, Keller	geo group
Fluid (69 samples)	Fluid Chemistry	Vent Fluid Sampler (HFS): Major samplers	Butterfield, Resing, Huber, Cowen	fluid group
Gas (15 samples	Gas Chemistry	Gas tight bottles and HFS gas samples	Lupton, Lilley	gas group

Total *Jason-2* ROV Samples: 174. This number does not include any sub-samples.

3.5.2 Sample Logs (See section 3.4, figs 6 through 12 for sample positions on dive maps)

(NOTE: Jason-2 dive logs are appended to the end of this document)

Latitude and longitude (vvlat/vvlong) positions are Jason renavigated "renav" locations. Renav is merged Doppler (DVL) and Ultra Short Baseline (USBL) with obvious bad fixes deleted. All times are UTC, 11 hours ahead of Samoan local time. vvrec is the virtual van record number. The Jason virtual van URL is: http://4dgeo.whoi.edu/jason/
Refer to the navigation section 4.0 for more information about position accuracy.

J413 Sample Log

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 sample comments (West Mata)	PI
J413-rock-01	geo	NW Flank	5/6 2009	16	09	-15.094240	-173.749841	41	102	3	1281	Hollow pillow fragment sample. At site of first contact with bottom. Not suspected to be zero age.	geo group
J413-rock-02	geo	NW Flank	5/6 2009	16	36	-15.094573	-173.749518	87	177	3	1246	Piece of ropey sheet flow outcrop. Large fragments. All off the same ledge. Probably not zero age?	geo group
J413-rock-03	geo	NW Flank	5/6 2009	17	08	-15.094894	-173.749122	150	134	1	1200	Pillow rind broken off edge of collapsed pillow. Zero age?	geo group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 sample comments (West Mata)	PI
J413-rock-04	geo	Hades	5/6 2009	17	42	-15.094747	-173.749097	222	77	4	1208	Scoria/spatter from edge of erupting vent. Very crumbly. Multiple pieces of same material. Suspected to be zero age.	geo group
J413-sed-05	geo	20m S of Hades	5/6 2009	18	00	-15.094765	-173.749097	252	154	7	1199	Primarily sand-sized grey glass fragments, but spatter fragments as large as 2.5 cm also are present. Limu, ribbons, Pele's hair, and sulfur spherules are common. Broken crystals of opx, cpx and ol are present . Coated or altered fragments are common, as are lithic fragments. Scoop sample about 20m distant from vent and about 8 meters shallower. Plume enveloping area. Suspected to be zero age.	geo group
J413-mat-06	bio	Summit	5/6 2009	18	28	-15.094656	-173.748762	312	107	4	1188	Suction sample the seds/mat at the summit. Pyroclastic glass coated with white mat material. Large sample.	bio / geo groups
J413-mat-07	bio	Red Rock Ridge	5/6 2009	19	11	-15.094600	-173.748612	382	41	4	1180	Suction white filamentous bacterial mat on rock outcrop in area of shimmering water. T=25C.	bio group
J413-mat-08	bio	White Mat Vent Mkr-154	5/6 2009	19	34	-15.094544	-173.748339	422	9	3	1167	Suction white filamentous bacterial mat on an outcrop. There is also orange staining. Tmax=21.3C.	bio group
J413-shrimp-09	bio	Prometheus area	5/6 2009	20	09	-15.094327	-173.748309	479	141	4	1177	Shrimp suction - lots of shrimp. The rocks here are covered with shrimp. Prelim ID: Chorocaris/Opaepele sp. Geological component of this sample includes about 50% coarse (to about 3 cm) spatter fragments with the remainder consisting of broken crystals of opx, cpx, and ol; pyroclasts including rare limu and Pele's hair, altered glass fragments, rare sulfur spherules, and two pink echinoid spines (perhaps contamination from the sampler?). The glass is grey colored. Fragments suspected to be zero age. 6m SW of Prometheus	bio group
J413-major-10	fluid	Prometheus	5/6 2009	20	22	-15.094330	-173.748252	502	87	2	1174	Fired major as close as could get to the plume. Zoomed in right over the flaming vigorous pit.	fluid group
J413-gtb-11	gas	Prometheus	5/6 2009	20	26	-15.094318	-173.748261	509	87	2	1174	Fired green gastight #2 right over Prometheus. No temperature info. Fluid weight = 160g.	gas group
J413-sed-12	geo	Prometheus	5/6 2009	20	34	-15.094317	-173.748264	525	88	2	1174	Scoop sample of the pyroclasts (fragments) near the vent orifice. Full bag of sediments. This sample is mainly gravel and coarse sand sized fragments. The largest pebble is about 5 cm across. There is little unmodified primary pyroclastic material present and most glass is fairly dense (~5% vesicles). The sample contains very abundant crystals, about twice as common as in the primary pyroclasts or lava samples. Altered or coated glass fragments are common. Glass is gray colored, thicker pieces grey-brown. Suspected to be zero age.	geo group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 sample comments (West Mata)	PI
J413-rock-13	geo	Prometheus	5/6 2009	20	40	-15.094304	-173.748369	534	124	9	1177	Large elongate rock ~ 9 inches long. Scoria/spatter. Vesicular. Suspected to be zero age.	geo group
J413-rock-14	geo	downslope (NW) of Hades	5/6 2009	21	39	-15.094666	-173.749284	636	126	2	1227	Pillow fragment with orange staining. About 10 inches long. Glassy rim. (Next to the active pillow flow with visible magma in crack). Suspected to be zero age.	geo group
J413-niskin-15	fluid	above Hades	5/6 2009	22	22	-15.09466	-173.74911	714	138	33	1205	Fired port niskin above Hades. Right loop. Z=1205. Altitude of 30m.	fluid group
J413-niskin-16	fluid	above Hades	5/6 2009	22	23	-15.09466	-173.74911	715	331	39	1199	Also in the plume above Hades. Z=1201. Altitude is 38m.	fluid group

J414 Sample Log

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 sample comments (West Mata)	PI
J414-rock-01	geo	SE of ridge crest/summit	5/7 2009	08	08	-15.093854	-173.747230	760	292	2	1219	Picking up an older piece of pillow fragment here. About 15cm long. Glass on the top. White-ish stain right below the upper glass rind. Not suspected to be zero age.	geo group
J414-hfs-02	fluid	Kohu	5/7 2009	09	16	-15.093686	-173.747740	897	62	3	1187	Unfiltered piston #1. Tmax=31.2 Tavg=31. Tamb=5.6. Low pH here. Temp got up to 31.1C. pH ~2.7. Don't see any exhaust coming out of the pump. There must have just been a problem with piston. Unsuccessful sample. Stop 0920.	fluid group
J414-hfs-03	fluid	Kohu	5/7 2009	09	25	-15.093703	-173.747731	912	62	3	1187	Unfiltered piston #24. White stained rock. Tmax=30.8 Tavg=30.4 Vol=459ml. pH 2.64. Stop 0927.	fluid group
J414-hfs-04	fluid	Kohu	5/7 2009	09	30	-15.093682	-173.747736	919	62	3	1187	Unfiltered piston #4. Same position as previous samples here at Kohu. Tmax=31.6. Tavg=30.6. Vol=535ml. T2=15. pH 2.64. Stop 0933.	fluid group
J414-hfs-05	fluid	Kohu	5/7 2009	09	35	-15.093699	-173.747750	928	63	3	1187	GFF filter #20 for Jim Cowen (POC sample). Large volume sample. One lonely shrimp in the area. Tmax=31.8 TAvg=30.9 Vol=3023ml. pH 2.64. Stop 0948 .	fluid group
J414-hfs-06	fluid	Kohu	5/7 2009	09	51	-15.093692	-173.747735	948	62	3	1188	DNA sample Sterivex filter #15 for Huber. Filter rate at 200ml/m. Haven't seen any animals here or anything else - including bacteria. Tmax=31.6. Tavg=29.8 Vol=3002ml. pH 2.64. Stop 1007.	fluid group
J414-gtb-07	gas	Kohu	5/7 2009	09	59	-15.093699	-173.747741	960	63	3	1187	Port HFS GTB #11. Simultaneous with sample 6. Tmax=31.6. Tavg=29.8. pH 2.64. Fluid weight = 168g	gas group
J414-hfs-08	fluid	Shrimp City	5/7 2009	11	06	-15.094007	-173.748093	1074	138	3	1181	Filtered bag #23. Z=1182. pH of 5.63 here. Tmax=14.9 Tavg=14.8. Vol=501ml. Stop 1109.	fluid group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 sample comments (West Mata)	PI
J414-hfs-09	fluid	Shrimp City	5/7 2009	11	11	-15.094027	-173.748092	1085	138	3	1181	Filtered bag #19. Tmax=14.8 Tavg=14.7. Vol=501ml. Stop 1115.	fluid group
J414-hfs-10	fluid	Shrimp City	5/7 2009	11	17	-15.094015	-173.748093	1094	138	3	1181	Sterivex filter #14 for Huber. Tmax=14.8 Tavg=14.6. Vol=3002ml. Stop 1133.	fluid group
J414-shrimp-11	bio	Shrimp City	5/7 2009	11	56	-15.094049	-173.748081	1142	137	3	1180	Suction of lots of shrimp here where the last 4 samples were taken. Probably 40 or more shrimp suctioned. Prelim ID: Chorocaris/Opaepele sp.	bio group
J414-rock-12	geo	upslope from Shrimp City	5/7 2009	12	04	-15.094062	-173.748062	1157	165	4	1175	Scoria/spatter. Piece of very friable rock from this section of pillows. Sample is about 15cm long pillow fragment. Really friable. Decent glassy rind. Very vesicular. Maybe 20 meters away from Shrimp City. Suspected to be zero age? Yes?	beo group
J414-hfs-13	fluid	Prometheus	5/7 2009	12	54	-15.094221	-173.748141	1241	139	5	1174	Filtered piston #2. Tamb=3.6 Tmax=47.5 Tavg=30.4. Vol=451ml. Stop 1257.	fluid group
J414-hfs-14	fluid	Prometheus	5/7 2009	12	59	-15.094206	-173.748149	1248	139	5	1174	Filtered piston #3. Prometheus directly in plume. Tmax=69.5 Tavg=58.5 Vol=354ml. Stop1301.	fluid group
J414-hfs-15	fluid	Prometheus	5/7 2009	13	09	-15.094189	-173.748137	1266	138	5	1174	Filtered Piston #5. Start 1309. In plume at Prometheus. Tmax=25.9. Tavg=23. Vol=385ml. Stop 1311.	fluid group
J414-GTB-16	gas	Prometheus	5/7 2009	13	29	-15.094187	-173.748154	1307	126	1	1174	Gastight bottle #9. Stbd manifold gastight. fired 1329. Temp went from 62 to 78 when fired. Then temp went down. Fluid weight = 165g	gas group
J414-hfs-17	fluid	Prometheus	5/7 2009	13	30	-15.094187	-173.748153	1310	127	1	1174	Unfiltered piston #6. In the plume. Tmax=40.2 Tavg=28.4. Vol=116ml. Stop 1331.	fluid group
J414-hfs-18	fluid	Prometheus	5/7 2009	13	54	-15.094185	-173.748135	1360	97	1	1174	Filtered piston #7. Dave says seems like the whole thing is clogged up. Tmax=41.6 Tavg=38 Vol=319ml. Stop 1356.	fluid group
J414-hfs-19	fluid	Prometheus	5/7 2009	13	56	-15.094180	-173.748134	1367	97	1	1174	Unfiltered piston #8. No pump exhaust. Does not seem to be working. Tmax=45.5 Tavg=42.8 Vol=unknown. Stop 1358.	fluid group
J414-GTB-20	gas	Prometheus	5/7 2009	14	23	-15.094190	-173.748141	1412	105	1	1174	GTB #5 from basket. Bottle was well into smoke. Lots of yellow in plume. Tmax was 45.5 for sample 19. Fluid weight = 149g	gas group
J414-GTB-21	gas	Prometheus	5/7 2009	14	37	-15.094205	-173.748144	1441	64	3	1174	Gastight GTB #7. Vent is vigorously venting and flaming. Placed gastight over flames and fired. Fluid weight = 168g	gas group
J414-rock-22	geo	Prometheus	5/7 2009	14	52	-15.094212	-173.748148	1467	86	3	1174	Scoria (spatter aggregate?) from edge of Prometheus rim. Suspected to be zero age.	geo group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 sample comments (West Mata)	PI
J414-sed-23	geo	SE of Shrimp City	5/7 2009	15	16	-15.094150	-173.747942	1514	82	3	1160	This sample includes abundant highly-vesicular spatter clasts as large as 7 cm. The finer portions of the sample are also mainly pyroclastic with spatter fragments, broken crystals of opx and cpx, rare limu o Pele and Pele's hair, and some altered or crystalline rock fragments. S spherules are present but rare. Two gastropod shells (about 2 mm long) are present—one was alive and the other dead when collected. Both are heavily stained with Fe, as are some of the spatter clasts. The glass is gray colored. Used Rick's scoop sampler to get the sample. Location: about 14m SE of Shrimp City. Not suspected to be zero age.	geo group
J414-hfs-24	fluid	Red Rock Ridge	5/7 2009	16	02	-15.094492	-173.748496	1596	43	2	1181	Filtered bag #16. Shimmering water at Red Rock Ridge. Presampling temp=14 and still rising. pH around 3 and decreasing. Tmax=16.8 Tavg=16.4 Vol=501ml. Stop 1605.	fluid group
J414-hfs-25	fluid	Red Rock Ridge	5/7 2009	16	06	-15.094478	-173.748502	1605	43	2	1181	Unfiltered bag #21. Same spot as sample 24. Pump stuck but started again so it's OK. Tmax=17.4 Tavg=17.0 Vol=602ml. Stop 1610.	fluid group
J414-hfs-26	fluid	Red Rock Ridge	5/7 2009	16	11	-15.094502	-173.748502	1613	43	2	1181	Filter #10. Same spot as samples 24 and 25. Start Tmax=18.4 Tavg=17.7 Vol=2002ml. Checked pH again at end. pH ~2.7. Stop 1622.	fluid group
J414-rock-27	geo	Red Rock Ridge	5/7 2009	16	38	-15.094488	-173.748489	1650	41	3	1181	Piece of pillow with iron coating. Same place as samples 24-26. Not suspected to be zero age.	geo-bio groups
J414-hfs-28	fluid	between Red Rock Ridge and Hades	5/7 2009	16	49	-15.094630	-173.748576	1668	46	3	1191	Background water sample. Filtered bag #17. Took sample while moving away from Red Rock Ridge towards Hades at depth of 1193m. . May not be background since pH is still reading 3. Stop 1652. We are at Hades already.	fluid group
J414-niskin-29	fluid	Hades	5/7 2009	17	51	-15.094620	-173.748985	1801	137	4	1206	Niskin bottle. 1204 m. At Hades vent.	fluid group
J414-niskin-30	fluid	Hades	5/7 2009	17	56	-15.094649	-173.748949	1804	129	12	1187	Niskin bottle - white fired first (forward).	fluid group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 sample comments (West Mata)	PI
J414-misc-31	geo	Hades and Prometheus	5/7 2009	?	?	-15.094206	-173.748149	?	?	5	1174	Mixture in the basket. Pyroclastic ejecta from Prometheus & Hades. (Prometheus position info given). ~70% fresh dense to moderately vesicular spatter, some clasts with smooth surfaces with the remaining 30% altered or dense crystalline lava clasts. These crystalline clasts are more olivine-rich than the glassy fragments. The finer fraction is mostly moderately dense angular glass fragments and broken crystals of opx, cpx, and ol. Some ol is spinel-bearing and others are spinel-free. Rare fluidal glass fragments occur in the finer grain size fraction. The sample had a strong smell of S as it dried out in an oven at 60°C and contained rare S spherules. One yellow echinoid spine is also present. The glass is gray colored.	geo group

J415 Sample Log

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 sample comments (NELSC)	PI
J415-rock-01	geo	Landing site. NW and downslope of ridge crest	5/8 2009	07	22	-15.390940	-174.252497	1858	172	1	1678	Shelly sheet/lobate crust ~15 cm long. Very fresh sheet/lobate lava flow. Suspected to be zero age.	geo group
J415-rock-02	geo	ridge axis area	5/8 2009	07	45	-15.391436	-174.252167	1909	187	1	1660	Crust of a collapsed sheet/lobate ~8 cm long. Glass on upper and lower surface. Very fresh sheet/lobate lava flow. Suspected to be zero age.	geo group
J415- rock-03	geo	ridge axis area	5/8 2009	07	52	-15.391611	-174.252057	1924	79	1	1662	Picked out of rubble pile. Crust from a jumbled chaotic sheet/lobate texture. Long and thin. ~10 cm. Very glassy. Very fresh sheet/lobate lava flow. Suspected to be zero age.	geo group
J415-rock-04	geo	ridge axis area	5/8 2009	08	04	-15.391826	-174.251889	1944	174	1	1668	Older looking rock among the fresher lava. Sheet flow lava (with Mn coating) from a small upstanding ridge several meters high (a kipuka). Sample is very friable. Not suspected to be zero age. Also collected a hydroid with the rock.	geo group
J415-rock-05	geo	ridge crest next segment	5/8 2009	09	20	-15.390300	-174.250429	2103	20	1	1658	Friable rock. Piece of push up structure at edge of this hackly sheet/lobate flow. Could be within the last century or younger - calling it "intermediate age".	geo group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 sample comments (NELSC)	PI
J415-rock-06	geo	ridge crest next segment	5/8 2009	09	31	-15.389986	-174.250259	2131	21	1	1652	Edge of pushed up burst "bubble". 5-6 cm tabular piece of fresh lava. ~2cm thick. Grabbed quite a large piece of the sheet/lobate skylight feature crust. [~40m S of Temp Anom target] Suspected to be zero age?	geo group
J415-rock-07	geo	ridge crest	5/8 2009	10	23	-15.388575	-174.248888	2237	91	3	1623	Piece of fresh, shiny lava (lava lobe) from this zero-age sheet/lobate flow. Crumbly. ~20cm across 15 cm long. The shape of a mushroom or a bakers hat. The rock broke in half. [~200m NE of Temp Anom target]	geo group
J415-rock-08	geo	ridge crest	5/8 2009	12	13	-15.385835	-174.246443	2430	157	2	1647	Piece of edge of roof at collapse pit. This is a sample of the very youngest lava in the area. Sulfur spheres on top. Part of that zero-age sheet/lobate lava flow	geo group
J415-sed-09	geo	ridge crest next segment ~100m S of Nautilus vent targe	5/8 2009	13	01	-15.384423	-174.244909	2542	24	1	1631	Sediments (incl. black sand) on top of jumbled sheet flow. This sample filled a large scoop bag. The largest fragments reach about 3 cm and are mostly spatter, although a few are more vesicular and could be considered scoria. The largest fraction is in the 1-3 mm sizes, with decreasing amounts in the 0.5-1 mm, 0.25-0.5 mm, 0.125-0.25 mm, and 0.063-0.125 size fractions. Almost nothing passed through the 63 micron sieve. The glass is nearly aphyric and is light brown colored. Nearly the entire sample consists of pyroclasts and limu o Pelel are common, as are Pele's hair, but the vast majority is angular spatter fragments of varying vesicularity. Lithic fragments are very rare and no broken crystals were observed. There are no bacteria strands or foraminifera. Some seds could be zero age.	geo group
J415-multi-bio-10	bio	Nautilus Mkr-148	5/8 2009	13	29	-15.383114	-174.244688	2604	197	2	1617	Suction of vent biology incl. shrimp, crabs, mussels, squat lobsters, vent fish, etc. Preliminary specimen IDs: Thermarces sp, Thermobioties mytilogeiton, Austinograea williamsi, Austinograea sp, Munidopsis sp, Alvinocaris sp, Vulcanolepas sp, Chorocaris/Opaepele sp, polychaetes, gastropods.	bio group
J415-multi-bio-11	bio	Nautilus Mkr-148	5/8 2009	13	42	-15.383127	-174.244689	2625	178	2	1617	Suction sample of vent biology. Repositioning a little for fresh animals. About 2 feet from previous sample. Shrimp, crabs, mussels, snails, squat lobsters, etc. Tmax between rocks=19.2. Preliminary specimen IDs: Eosipho sp, Thermarces sp, Munidopsis sp, Austinograea sp, Austinograea williamsi, Alvinocaris sp, Bathymodiolus sp, Chorocaris/Opaepele sp, Polychaetes, Gastropods.	bio group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 sample comments (NELSC)	PI
J415-bio-geo-12	bio	Nautilus Mkr-148	5/8 2009	14	06	-15.383137	-174.244671	2661	178	2	1618	Barnacles attached to a rock. Rock is a piece of pillow - not suspected to be zero age. Tmax next to rock=9.7. Preliminary specimen IDs: Polychaetes, Gastropods, Barnacle morph, Scaleworm.	bio-geo groups
J415-mussels-13	bio	Nautilus Mkr-148	5/8 2009	14	23	-15.383158	-174.244688	2687	178	3	1616	Scoop of big clump of mussels on a rock (piece of pillow - not suspected to be zero age). Tmax=8.0 in place where mussels were harvested. Preliminary specimen IDs: Bathymodiolus sp, Polychaetes, Gastropods.	bio group
J415-major-14	fluid	Nautilus Mkr-148	5/8 2009	14	45	-15.383147	-174.244681	2726	180	3	1616	Major sample between rocks where temp was 20.1. Weak flow of somewhat smoky water coming out of crack where sample is being taken.	fluid group
J415-tubeworms-15	bio	Nautilus Mkr-148	5/8 2009	14	49	-15.383158	-174.244688	2734	180	3	1616	Tubeworm with curly tube casing. Grabbed 2 rocks with tubeworms attached. Tmax=8.9. at spot where worms were picked up. Deployed Mkr-148 next to sample site. Preliminary specimen IDs: Tubeworms, Polychaetes, Gastropods, Barnacles, Limpets, Bathymodiolus sp, Scaleworm. Rocks are scoria/spatter - not suspected to be zero age.	bio group
J415-multi-bio-16	bio	Nautilus Mkr-148	5/8 2009	15	11	-15.383165	-174.244668	2773	187	3	1615	Tubeworms. Temp amongst worms Tmax>17 between rocks. Temp where worms are=8.8 Worms are on bare rocks next to mussels. Collected two rocks with worms attached, and one more rock that has worms and barnacles and mussels. Preliminary specimen IDs: Tubeworms, Polychaetes, Gastropods, Limpets, Bathymodiolus sp, Scaleworm. Rocks are sheet flow - not suspected to be zero age.	bio group
J415-gtb-17	gas	Nautilus Mkr-148	5/8 2009	15	24	-15.383165	-174.244675	2793	185	3	1615	GTB #6. Using unmarked gastight (stbd side). Tmax at gastight location = 20.9. Fluid wt. (g) = 172.	gas group
J415-rock-18	geo	E of Mkr-148	5/8 2009	16	03	-15.383081	-174.243338	2861	350	1	1636	Pulling the crust off the top of a pillow after breaking off a couple of pieces. The rock is from the top of a collapsed lava lake in this sheet/lobate flow. Suspected to be zero age. ~150m E of Mkr-148	geo group
J415-major-19	fluid	NE of Mkr-148	5/8 2009	17	19	-15.381675	-174.241880	2999	330	9	1634	Yellow major sampler. Tripped for background sample.	fluid group
J415-rock-20	geo	NE of Mkr-148	5/8 2009	17	42	-15.382339	-174.241917	3030	323	1	1657	Flat 1.5 inch slab of lobate flow crust. From hollow lobate flow. North end of the lava flow. Suspected to be zero age.	geo group

J416 Sample Log

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hd g	alt	jasZ	J416 Sample Comments (NELSC and Maka)	PI
J416-sed-01	geo	near landing	5/9 2009	04	37	-15.389232	-174.253560	3113	129	2	1815	~12 cm long pushcore. The entire core is dominantly glass, but planktic foraminifers and rare diatoms are present in each subsection as well. The character of the coarse glass changes through the core with only rare limu o Pele in the basal portions, increasing up-section. Pele's hairs are very rare in the entire core, although more abundant in the fine fractions. The pyroclasts near the bottom are mostly scoria to finely vesicular fragments that approach pumice. There are no obvious flow fragments or other lithic fragments in the core, although some scoria fragments are altered to a white amorphous silica(?). Additional fragments, particularly near the bottom, are coated with brown hydrothermal precipitates, but most glass is fresh throughout the core. The glasses are all light brown in color. Each subsection has about twice as much material in the >500 micron fraction as in the 63-500 micron fraction. Zero age? yes/no	geo group
J416-sed-02	geo	near landing	5/9 2009	04	42	-15.389234	-174.253574	3121	129	2	1815	Small scoop sample that consists almost entirely of glass fragments of pyroclastic origin. The largest fragments are cm-sized, but about half the sample is 0.063-0.5 mm in size. A significant amount passed through the 63 micron sieve. Limu o Pele fragments are fairly rare and Pele's hairs absent. Some of the fragments are stained reddish brown, but most are fresh. Plnktic foraminifers are common, comprising a percent or so of the bulk sample. The finer fraction contains abundant lava ribbons. Zero age? yes/no	geo group
J416-rock-03	geo	traveling up N slope	5/9 2009	05	19	-15.390445	-174.252966	3203	125	3	1743	Piece of a plate?. Small fragment of older material with iron oxide staining on other surfaces. 1 cm thick glass rind. Looks fairly vesicular. Sampled while climbing up the north side of the ridge toward the ridge crest. Not suspected to be zero age.	geo group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hd g	alt	jasZ	J416 Sample Comments (NELSC and Maka)	PI
J416-sed-04	geo	traveling up N slope	5/9 2009	05	24	-15.390427	-174.252969	3213	125	3	1743	Sediment right next to previous sample. Small sediment scoop sample that consists almost entirely of glass fragments of pyroclastic origin. The largest fragments are cm-sized, and about ¾ of the sample is coarser than 3 mm. The 0.063-0.5 fraction is perhaps 5% of the sample. The fine and medium fractions contain abundant bacterial filaments and some planktic foraminifers. Limu o Pele are rare and Pele's hairs absent, except in the fine fraction which has abundant lava ribbons and highly vesicular fragments. The coarser spatter fragments range from nearly dense to almost pumiceous. Zero age? yes/no	geo group
J416-sed-05	geo	not quite at ridge crest traveling S.	5/9 2009	06	11	-15.392141	-174.252336	3312	187	2	1668	Small sediment scoop sample that consists almost entirely of glass of pyroclastic origin. The largest fragments are about 0.5 cm in size. The 3 mm to 0.5 mm fraction is about 50% of the sample, with about 25% both finer and coarser grained. Some fragments are entirely encased in smooth glass, rather than the usual broken spatter fragments. Pele's hair is rare and small and limu o Pele-like fragments very rare, but lava ribbons are more common in the finer fraction. Also in the fine fraction are common bacterial filaments and planktic foraminifers and rare agglutinated benthic foraminifers. Zero age? yes/no	geo group
J416-rock-06	geo	near ridge crest summit	5/9 2009	06	29	-15.392578	-174.252726	3347	243	1	1660	Large rock from older ropey sheet flow. Piece of curtain-folded jumbled sheet. Slightly stained. Near ridge crest traveling S. Questions about age of rock.	geo group
J416-rock-07	geo	south ridge crest	5/9 2009	07	28	-15.394323	-174.253524	3472	126	2	1641	Rock broken off large sheet covered with sediment in old lava. Sample is flat and about 20 cm long. Not suspected to be zero age.	geo group
J416-rock-08	geo	S side of Maka - landing spot	5/9 2009	11	14	-15.423513	-174.285538	3507	36	3	1595	Sample from area of broken up older pillow lavas. Rubbly. Cube-shaped with a thin glassy rind. Lots of orange staining on 2 sides. Not suspected to be zero age.	geo group
J416-sulfide-09	geo	Maka Mkr-149 area	5/9 2009	12	39	-15.422014	-174.283567	3673	171	6	1528	Base of a sulfide chimney. Tmax=58 in base of chimney after breaking it off. Did not get top of chimney that was covered in white mat. It crumbled. Sample was smelly, thick chalcopyrite inner and outer white crust. Very hard. Some pyrrohtite.	bio group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hd g	alt	jasZ	J416 Sample Comments (NELSC and Maka)	PI
J416-sulfide-10	geo	Maka sulfide mound	5/9 2009	13	57	-15.422162	-174.283773	3765	179	4	1530	Active sulfide chimney from sulfide mound. Chimney is crumbly with lots of smoke coming out. Tip fell off, rest hard iron oxide rich outer , inner chalcopyrite lined conduits, some anhydrite. Broke in 3 main pieces. Tmax=160.	bio group
J416-major-11	fluid	Maka sulfide mound	5/9 2009	14	23	-15.422192	-174.283781	3816	140	7	1525	Black major sampler. Black smoker orifice at Maka sulfide mound. Clear fluid near orifice before black smoke precipitates out. Tmax=315. (Temp >200)	fluid group
J416-major-12	fluid	Maka sulfide mound	5/9 2009	14	30	-15.422188	-174.283771	3831	139	7	1525	Green major sampler. Taking another sample from same black smoker orifice as J416-major-11. Tmax=315. (Temp >200)	fluid group
J416-gtb-13	gas	Maka sulfide mound	5/9 2009	14	35	-15.422199	-174.283795	3843	139	7	1525	Gastight bottle #2 (green) in the same black smoker orifice as the major samples just completed. Tmax=315. Fluid wt. (g) = 140.	gas group
J416-gtb-14	gas	Maka sulfide mound	5/9 2009	14	47	-15.422191	-174.283751	3866	141	7	1525	Gastight bottle #11 (yellow) in same black smoker orifice as the green gastight and 2 major samples just taken. Tmax=315. Fluid wt. (g) = 143.	gas group
J416-shrimp-15	bio	Maka sulfide mound	5/9 2009	15	15	-15.422180	-174.283783	3921	155	3	1529	Suction sample of shrimp from side wall of sulfide spire at Maka. Hose is not connected to chamber. **FAILED SAMPLE**	bio group
J416-sulfide-16	geo	Maka sulfide mound	5/9 2009	15	46	-15.422253	-174.283733	3980	338	4	1520	Trying again to get a sample of an active sulfide chimney. **FAILED SAMPLE**	bio group
J416-major-17	fluid	Maka sulfide mound	5/9 2009	16	14	-15.422207	-174.283808	4031	163	7	1525	Red major sample taken on the side of Maka sulfide structure where temperature was previously 315C. We can really see the fluid pouring out the bottle meaning it looks like a good sample. (Temp >200).	fluid group
J416-major-18	fluid	Maka sulfide mound	5/9 2009	16	16	-15.422230	-174.283780	4038	163	7	1525	Yellow major sample taken at side of Maka sulfide structure where temperature was previously 315 C. Can see the fluid pouring out of the bottle. (Temp >200)	fluid group
J416-gtb-19	gas	Maka sulfide mound	5/9 2009	16	21	-15.422206	-174.283797	4049	163	7	1525	Gastight bottle #7 (black and orange) at same spot on side of Maka sulfide structure as majors J416-majors-17 and 18. Fluid wt. (g) = 148.	gas group
J416-gtb-20	gas	Maka sulfide mound	5/9 2009	16	30	-15.422219	-174.283765	4065	166	7	1525	Gastight bottle #5 (black and white) at same spot on side of Maka sulfide structure as the previous orange gastight and 2 major samples. Fluid wt. (g) = 143.	gas group
J416-sulfide-21	geo	Maka sulfide mound	5/9 2009	17	00	-15.422217	-174.283769	4121	181	3	1531	Fragile, small sulfide chimney (chimlet) from Maka sulfide mound. Tmax=132 in hole after chimney was broken off. Some white outer coat, top broke into a few pieces, large piece had some conduits, lined with hard chalcopyrite, some soft mushy mineral interior.	bio group

sample name	type	Location	date	hr	min	vv lat	vv long	vv rec	hd g	alt	jasZ	J416 Sample Comments (NELSC and Maka)	PI
J416-tubeworms-22	bio	SW of (near) Maka sulfide mound - Marker "E"	5/9 2009	17	38	-15.422440	-174.284178	4203	80	3	1541	Grab sample of tubeworms near Maka sulfide mounds (about 50m at hdg=240 from the large sulfide mound). HDcam transect over this worm and mussel area (start=17:28:00; end=17:39:34; lasers on). Worms appear to be healthy and alive but do not see fluid flow. Assume fluid flow is present given the amount of animals present. Can see at least one worm with plume extended. Preliminary specimen ID: tubeworms. Rock collected with worms is an older pillow.	bio group
J416-mussels-23	bio	SW of (near) Maka sulfide mound - Marker "A"	5/9 2009	17	53	-15.422522	-174.284254	4238	152	2	1540	Scoop sample of mussels. Crabs and squat lobsters also in area. Preliminary specimen ID: Bathymodiolus sp, Branchipolynae commensals, Munidopsis sp.	bio group

J417 Sample Log

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 sample comments (West Mata)	PI
J417-rock-01	geo	S of SW summit ridge	5/10 2009	06	12	-15.096420	-173.750489	4309	354	5	1320	Piece of older pillow fragment a little bit of staining on one face. Shaped like a wedge of pie. Looks like this is a big flow front of pillow lavas with staining. Not suspected to be zero age.	geo group
J417-rock-02	geo	S of SW summit ridge	5/10 2009	06	20	-15.096146	-173.750414	4326	356	2	1288	Flat sample from this older sheet flow. Glassy plate. Vesicular. Fresh and oxidized a little bit on the surface. Lots of glass. From the top of the pillow wall (wall is about 80m high). Not suspected to be zero age.	geo group
J417-mat-03	bio	Mat Meadow	5/10 2009	06	46	-15.096024	-173.750495	4383	41	2	1282	Lots of red mat and possibly some white collected with Davis sampler. Geologically this sample is a real mixed bag. There are abundant primary pyroclasts, including limu o Pele and Pele's hair. Spatter fragments and lithic clasts are also abundant. Lithic clasts include rounded pebbles with all glass abraded. Altered or coated fragments are common. Sulfur spherules are present but not common. The glass is pale brown. Mat Meadow is an extensive field of white and interspersed red mats.	bio group
J417-mat-04	bio	Mat Meadow	5/10 2009	07	06	-15.096025	-173.750423	4414	32	2	1282	Scoop of white mat on top and black pyroclastic sand beneath. Temp in white sediment - probe inserted 14cm. Tmax=25.2	bio group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 sample comments (West Mata)	PI
J417-hfs-05	fluid	Luo	5/10 2009	07	58	-15.095646	-173.750414	4531	102	1	1278	Unfiltered bag #21. Sample of diffuse flow from a large pit found among a large sediment field near ridge crest. pH ~5.1. Tmax=22.4 Tavg 21.5 Vol=550ml. [Gas descriptor=flask22, fluid wt. (g)=35.]	fluid group
J417-hfs-06	fluid	Luo	5/10 2009	08	03	-15.095643	-173.750421	4537	102	1	1278	Sterivex filter #15. Sample of diffuse flow from deep pit found among a large sediment field near ridge crest. pH ~5.1. Tmax=22 Tavg=20.2 Vol=3002ml. Stop 0809.	fluid group
J417-hfs-07	fluid	Luo	5/10 2009	08	20	-15.095645	-173.750412	4541	102	1	1278	Filtered piston #5. Sample of diffuse flow from large pit found among a large sediment field. pH ~5.1. Tmax=21.1 Tavg =18.9. Vol=500ml. Stop 08:23	fluid group
J417-hfs-08	fluid	Luo	5/10 2009	08	25	-15.095635	-173.750423	4544	102	1	1278	GFF filter #20. Sample of diffuse flow from a deep pit found among a large sediment field. POC sample for Cowen. pH ~5.1. Tmax=22.7 Tavg=20.8 Vol=5000ml. Stop 09:03.	fluid group
J417-rock-09	geo	SW of Hades on ridge crest near hydrophone	5/10 2009	09	47	-15.094926	-173.749211	4675	50	4	1206	Rind from lobate flow that are broken at the edge of the ridge. Small piece. Orange staining on 3 of 2 sides and glassy on 1. About 7 cm long. (Between Luo and Red Rock Ridge ~25m SW of Hades on ridge crest). Zero age? Yes?	geo group
J417-hfs-10	fluid	Epsilon	5/10 2009	10	27	-15.094523	-173.748576	4747	161	4	1186	Unfiltered bag #22. No exhaust out the back of the sampler. Tmax=29.6. Tavg=28.1. This is a site of flowing white mat dubbed "Epsilon". Sample failed?	fluid group
J417-hfs-11	fluid	Epsilon	5/10 2009	10	38	-15.094520	-173.748589	4766	161	4	1186	Unfiltered bag #23. The exhaust was flakey but T2 started working again. Tmax=30.6 Tavg=26.3 Vol=500ml. Stop1041.	fluid group
J417-hfs-12	fluid	Epsilon	5/10 2009	10	50	-15.094533	-173.748588	4782	161	4	1186	Filtered bag #19. It's working now. Tmax=33.1 Tavg=31.8 Vol=500ml. [Gas descriptor=flask15, fluid wt. (g)=30]	fluid group
J417-hfs-13	fluid	Epsilon	5/10 2009	10	55	-15.094516	-173.748588	4788	161	4	1186	Sterivex filter #14. (The HFS computer clock says 0355 AM instead of 1055 UTC) This is Kevin's computer and they didn't reset the time on it. Tmax=30.5 Tavg=26.2 Vol=3002ml. Stop 11:11.	fluid group
J417-hfs-14	fluid	W/SW of Prometheus	5/10 2009	12	32	-15.094360	-173.748389	4963	184	15	1175	Filtered bag #16. Water is murky. Confirm it is working by looking at exhaust. Jason is in the plume but cannot see vent. Near Prometheus vent (~10m W/SW). Background sample. Tmax=3.7 Tavg=3.6. Vol=454ml.	fluid group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 sample comments (West Mata)	PI
J417-hfs-15	fluid	Prometheus	5/10 2009	12	48	-15.094272	-173.748107	4988	161	5	1173	Filtered piston #2. Sampler wand in plume. Jason is locked in place at rim of vent. Jason temp=4.7. Tmax=13.9 Tavg=6.2 Vol=? Giving error probably ~ 400ml.	fluid group
J417-hfs-16	fluid	Prometheus	5/10 2009	12	56	-15.094272	-173.748107	0	0	0	1173	Filtered piston #3. Wand in the plume. Pump is on. Temp going up. Not seeing anything coming out of fluid sampler exhaust. Tmax=44.8 Tavg=16.2. Vol=200ml.	fluid group
J417-hfs-17	fluid	Prometheus	5/10 2009	13	01	-15.094272	-173.748107	0	0	0	1174	Unfiltered piston #4. Tmax=60.8 Tavg=15.9 Vol=200ml.	fluid group
J417-hfs-18	fluid	Prometheus	5/10 2009	13	07	-15.094272	-173.748107	0	0	0	1174	Unfiltered bag #24. Something is coming out of exhaust. Tmax=13.4 Tavg=7.2 Vol=331ml. T2 got up to 8 degrees so there was warm water in the system. [Gas descriptor=flask17, fluid wt.(g)=32.]	fluid group
J417-hfs-19	fluid	Probably SW of Hades	5/10 2009	14	58	-15.094852	-173.749220	0	0	0	1214	Filtered piston #9. Background sample. Sampling while cleaning tephra out of the basket. Tmax=3.3 Tavg=3.2. Vol=556ml. Stop 1501. Note: Navigation was bad from 134655 to 160700 so not sure where we were.	fluid group
J417-hfs-20	fluid	Hades	5/10 2009	16	24	-15.094663	-173.748974	5314	78	4	1202	Piston #6 Probe placed into plume about 1/2 meter from source in exploding rock. Sample of main Hades plume. Plume suddenly stopped briefly during sampling. Small bursts of red evident. Tmax=43.1 Tavg=19.1 Vol=412ml. Stop 1627.	fluid group
J417-hfs-21	fluid	Hades	5/10 2009	16	30	-15.094663	-173.748974	5324	78	4	1202	Unfiltered piston #8. Sample of main Hades plume about 1/2 of meter from source. Tmax=50.3 Tavg=42.6 Vol=491ml.	fluid group
J417-hfs-22	fluid	Hades	5/10 2009	16	34	-15.094663	-173.748973	5333	77	4	1202	Filtered piston #7. Sample of Hades plume. Pump is stalling. HFS probe is about 1.2 meter from source. Tmax=49.1 Tavg=47.8 T2=16 Vol=unknown.	fluid group
J417-gtb-23	fluid	Hades	5/10 2009	16	41	-15.094670	-173.748978	5345	84	4	1202	Port gastight #11. Flames and red evident in plume. T1=32 T2=12. Sample failed(?). Fluid wt.(g)=167. T=50.	gas group
J417-gtb-24	fluid	Hades	5/10 2009	16	46	-15.094670	-173.748978	5354	84	4	1202	Starboard gastight #9. T1=31 T2=12. Fluid wt.(g)=165. T=50.	gas group
J417-hfs-25	fluid	Hades	5/10 2009	16	48	-15.094670	-173.748978	5358	84	4	1202	Unfiltered piston#1. Fluid sample of Hades plume. HFS sample right in plume above red glowing vent. Tmax=48.8 Tavg=40.2 Vol= 365ml T2=17.	fluid group
J417-niskin-26	fluid	above Hades	5/10 2009	17	41	-15.094655	-173.748863	5462	79	18	1179	Niskin sample in Hades plume. Simultaneous with sample 27.	fluid group
J417-niskin-27	fluid	above Hades	5/10 2009	17	42	-15.094661	-173.748795	5464	74	17	1179	Niskin sample in Hades plume.	fluid group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 sample comments (West Mata)	PI
J417-tephra-28	geo	Prometheus area	5/10 2009	0	0	-15.094272	-173.748107	0	0	0	0	Sample consists of the material that was deposited in the drawer during a large explosion when Jason was sampling water on the edge of the Prometheus vent. The finer sediment fractions is 70% mineral grains of opx, cpx, and ol, in decreasing order of abundance, angular to rounded rock fragments to 4 cm (although larger ones were emptied from the drawer to regain buoyancy), glass fragments that are commonly abraded and rounded, coated and altered glass and crystal fragments, and minor sulfur spherules that are generally pitted. The coarser fractions include abundant rounded lithic clasts, usually with little or no glass remaining, more angular lithic fragments, and smooth moderately-vesicular spatter fragments. Some suspected to be zero age.	geo group

J418 Sample Log

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J418 Sample Comments (West Mata)	PI
J418-rock-01	geo	N of NE Rift Zone	5/11 2009	05	20	-15.087979	-173.742348	5562	206	5	1562	Older pillow at landing site. Light colored lava flow here that looks altered. Altered pillow fragment - in place. The surface of the rock is quite convoluted and folded over. 15 cm long 8 cm wide. Vesicular. Yellow oxidation rind. Did also collect a fresh small rock chunk. Not suspected to be zero age.	geo group
J418-coral-02	bio	Climbing up (N to S) NE Rift Zone area	5/11 2009	06	05	-15.088790	-173.741883	5661	150	3	1492	Soft coral. It has a crab on the inside of it. Octocorals (Chrysagorid?) are relatively common. Two galatheid or Chirostylid crabs on coral - where They live exclusively, usually a pair of crabs per coral. The crabs fell off and did not make it into the box. This is very old lava flow because the coral is really big (for this type of coral) - and they grow very slowly. The sample has a fresh, small rock chunk still attached that is not zero age.	bio group
J418-sed-03	geo	NE rift zone	5/11 2009	06	40	-15.089463	-173.741719	5734	197	4	1464	Scoop sample of fine grained sediment located amongst the pillows. This sample is mainly fine grained with about 80% smaller than 500 microns. The finer fraction is mostly fluidal lava fragments and some broken crystals. The coarse fraction is an amazing collection of Pele's hair and limu o Pele, most very thin-walled. A few dense crystalline rock fragments and glass fragments up to about 3 mm size are also present. The glass is pale brown. Some sediments may be zero age - others are not.	geo group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J418 Sample Comments (West Mata)	PI
J418-rock-04	geo	NE rift zone	5/11 2009	06	46	-15.089473	-173.741698	5746	202	5	1462	Rock sample broken off a pillow. Glassy pillow rind crust with staining on top. Sulfur globules also present. Shiny on the bottom. Probably not (?) zero age.	geo group
J418-rock-05	geo	NE rift zone	5/11 2009	07	35	-15.091010	-173.743415	5853	239	4	1359	Orange stained pillow fragment. Vesicular 7-8 cm across. Probably not (?) zero age.	geo group
J418-rock-06	geo	NE rift zone	5/11 2009	08	37	-15.093117	-173.746763	5971	296	6	1249	Small piece of pillow crust that is quite glassy but also has some staining. From lip of glassy pillow. 2cm glass rind. 6 cm long. This sample is from the outcrop ridge that we came upon after traveling along a relatively flat "pit" feature for 100m. Not suspected to be zero age.	geo group
J418-sed-07	geo	NE rift zone	5/11 2009	08	44	-15.093108	-173.746919	5985	282	4	1237	Sediment scoop of volcaniclastic sediments just upslope from sample 6. This sample is almost 100% pyroclasts of light brown glass with rare clinopyroxene crystals. Limu o Pele and Pele's hair are common, as are coarsely vesicular scoria-like fragments. Some sediments may be zero age - others are not.	geo group
J418-hfs-08	fluid	Creamsicle Mkr-2	5/11 2009	09	31	-15.093636	-173.747961	6075	172	2	1194	Unfiltered bag #21. Ambient temp=3.9 Lots of flow here. High pH=7.7 Tmax=29.3 Tavg=29.1 Vol=550ml. Area of strong diffuse flow about 28m bearing 100 to Kohu target position. Orange and white mat on the rocks.	fluid group
J418-hfs-09	fluid	Creamsicle Mkr-2	5/11 2009	09	34	-15.093634	-173.747969	6080	172	2	1194	Filtered bag #19. Tmax=29.3 Tavg=29.1 Vol=551ml.	fluid group
J418-hfs-10	fluid	Creamsicle Mkr-2	5/11 2009	09	38	-15.093658	-173.747941	6088	172	2	1194	Sterivex filter #15. Tmax=29.2 Tavg=29.0 Vol=3002ml. pH is ~7.5. Stop 0954.	fluid group
J418-rock-11	geo	near summit - SE side	5/11 2009	10	39	-15.094161	-173.747466	6185	221	5	1208	Small pillow fragment collected near the summit on the south side. No glass. Orange staining. Older looking lavas here than on the north side of the summit. Not suspected to be zero age.	geo group
J418-hfs-12	fluid	Hades	5/11 2009	12	34	-15.094580	-173.749146	6377	82	3	1201	Unfiltered piston #1. Good flow of exhaust. Occasional bubbles coming out of sand in front of plumes. Flush pump stopped momentarily during sampling but started again. Gastight sample J418-gtb-13 fired during this sample. Tmax=58.1 Tavg=48.3 Vol=425ml.	fluid group
J418-gtb-13	fluid	Hades	5/11 2009	12	35	-15.094587	-173.749163	6381	82	3	1201	Port GTB #7 fired simultaneous with previous HFS sample. Fluid wt.(g)=125. T=55, 76, 95 max.	gas group
J418-hfs-14	fluid	Hades	5/11 2009	12	37	-15.094593	-173.749183	6388	82	3	1201	Filtered piston #2. Good exhaust to start but then pump had stopped itself. Shows slow flow rate at exhaust. Dave slowed down pump rate a little and it worked better. Tmax=76.3 Tavg=71.4 Vol=360ml.	fluid group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J418 Sample Comments (West Mata)	PI
J418-hfs-15	fluid	Hades	5/11 2009	12	43	-15.094584	-173.749153	6402	82	3	1201	Unfiltered piston #4. Exhaust flow looks good. Tmax=74.1 Tavg=58.5 T2~11 Vol=488ml.	fluid group
J418-hfs-16	fluid	Hades	5/11 2009	12	49	-15.094589	-173.749170	6411	81	3	1201	Filtered bag #18. Tmax=76.2 Tavg=53.9 Vol=183ml T2~11. pH=1.24 There might also actually be some sulfide (H2S) in this one too H2S=1.62volts.	fluid group
J418-gtb-17	gas	Hades	5/11 2009	13	20	-15.094599	-173.749157	6466	81	3	1201	Green GTB #2. At same position as all the fluid samples (sample numbers 12-16). Occasional bubbles seen. [gas descriptor -green. Fluid wt.(g)=181. T=55, 76, 95 max]	gas group
J418-rock-18	geo	ridge above Hades - near hydrophone	5/11 2009	13	50	-15.094677	-173.749183	6524	155	4	1199	Broke off edge of lobate. Looking for glassy rock and this seems OK. Suspected to be zero age.	geo group
J418-rock-19	geo	ridge above Hades - near hydrophone	5/11 2009	13	57	-15.094684	-173.749198	6536	154	6	1198	Rind of a hollow pillow. 2-4" inch thick rind. Came from same place as J418-rock-18 but is a different type of rock and probably more glassy. Samples are from ridge above Hades but between Hades and the hydrophone. Could see hydrophone marker just off to right in view while sampling. Suspected to be zero age.	geo group
J418-rock-20	geo	Akel's Afi?	5/11 2009	14	11	-15.094439	-173.749064	6557	170	6	1197	Very fragile rock (scoria) from area adjacent to Akel's Afi(?) vent. Suspected to be zero age.	geo group
J418-sed-21	geo	Akel's Afi?	5/11 2009	14	17	-15.094458	-173.749040	6570	221	1	1198	Scoop sample of volcanic fragments on slope near Akel's Afi vent. This sample is primarily sand-sized angular glass and opx, cpx, and ol crystal fragments, but angular spatter and lithic clasts as large as 6 cm are also present. Almost none of the glass is fluidal. Sulfur spherules are common, as are coated or altered fragments. Suspected to be zero age.	geo group
J418-hfs-22	fluid	Akel's Afi?	5/11 2009	14	43	-15.094441	-173.749027	6601	218	2	1198	Filtered piston #5. Reaching into plume to right side. One just to the left of this one has flaming at base and lots of tephra jetting into plume. Want a plume with less tephra in it to keep from clogging sampler. Pump keeps starting and stopping. Tmax=28.4 Tavg=20.7 T2=7 Vol=~100ml (?)	fluid group
J418-hfs-23	fluid	Akel's Afi?	5/11 2009	14	47	-15.094436	-173.749040	6621	218	2	1198	Unfiltered piston #6. Tmax=26.7 Tavg=23 T2=7 Vol=475ml. [gas descriptor - flask 17 Fluid wt.(g)=18]	fluid group
J418-gtb-24	gas	Akel's Afi?	5/11 2009	14	51	-15.094369	-173.748933	6629	218	2	1198	Stbd GTB #9. T1=21 T2=6 Fluid wt.(g)=165. Same position as fluid samples 22 and 23.	gas group
J418-hfs-25	fluid	Red Rock Ridge (Mkr-9)	5/11 2009	16	08	-15.094420	-173.748445	6703	96	3	1180	Unfiltered bag #24. Sampling in weak flow coming from beneath a rock with white staining. Tmax=13.8 Tavg=13.2 Vol=585ml T2=6.	fluid group
J418-hfs-26	fluid	Red Rock Ridge (Mkr-9)	5/11 2009	16	28	-15.094387	-173.748459	6731	95	3	1180	Filtered bag #16. Diffuse flow. Tamb=5.0 Start 162532. Tmax=9.8 Tavg=9.1 Vol=450ml.	fluid group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J418 Sample Comments (West Mata)	PI
J418-hfs-27	fluid	Red Rock Ridge (Mkr-9)	5/11 2009	16	30	-15.094393	-173.748455	6735	95	3	1180	Sterivex filter #14. Diffuse flow. Slowly adjusted probe for better temp during sampling. Tmax=14.6 Tavg=8.8 Vol=3050ml.	fluid group
J418-hfs-28	fluid	Red Rock Ridge (Mkr-9)	5/11 2009	16	48	-15.094404	-173.748459	6763	95	3	1180	GFF filter #20. Organics sample of diffuse flow. Filter slowed during sampling. pH = 6.58. Tmax=16.0 Tavg=13.8 Vol=2155ml.	fluid group
J418-hfs-29	fluid	Red Rock Ridge (Mkr-9)	5/11 2009	17	03	-15.094401	-173.748460	6783	96	3	1180	Unfiltered bag #23. In diffuse flow. Tmax=19.4 Tavg=18.9 Vol=580ml. Lost this sample - overfilled.	fluid group
J418-shrimp-30	bio	Shrimp City Area	5/11 2009	17	37	-15.094056	-173.748000	6849	123	5	1175	Suction sample of shrimp. Lots of shrimp - on white patch! Some flow evident. Preliminary id: Chorocaris/Opaepele sp. Took several temperature measurements in the white mat: Temp (in mat)=9.9 Temp (in mat)=21.5 Temp (out of mat)=7.3 Temp (in small crack)=20.7.	bio group
J418-hfs-31	fluid	Shrimp City Area	5/11 2009	17	55	-15.094051	-173.748018	6881	121	5	1175	Unfiltered bag #22 at diffuse flow at location with hundreds of shrimp - just a few meters above Shrimp City. Tamb=5.2 pH=6.65 Tmax=19.3 Tavg=18.9 Vol=403ml	fluid group
J418-hfs-32	fluid	Shrimp City Area	5/11 2009	17	58	-15.094051	-173.748017	6888	121	5	1175	Filtered bag #17 sample of diffuse flow at location above Shrimp City. Tmax=18.8 Tavg=18.1 Vol=412ml.	fluid group
J418-hfs-33	fluid	Above Shrimp City Area	5/11 2009	18	18	-15.094051	-173.748017	n/a	?	?	?	Filtered piston #3. This was not recorded in the dive log but was in Dave's spreadsheet (sm). If the time is correct it was for background on the way up. Start 181816 (left bottom at 1805). Tmax=6.1 Tavg=5.5. Vol=570ml.	fluid group

Dive J419 aborted. No bottom time. No samples.

J420 Sample Log

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 sample comments (West Mata)	PI
J420-rock-01	geo	near landing - S flank	5/12 2009	11	09	-15.102776	-173.755626	6982	347	19	1795	Old welded scoria off an outcrop with lots of staining. Near our landing site >1km SW of summit and ~350 km S of ridge crest. Not suspected to be zero age.	geo group
J420-rock-02	geo	S flank	5/12 2009	11	36	-15.101929	-173.755604	7030	25	14	1738	Large stained rock broken from old sheet/lobate flow. Not suspected to be zero age.	geo group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 sample comments (West Mata)	PI
J420-sed-03	geo	S flank	5/12 2009	11	43	-15.101599	-173.755551	7044	293	5	1719	This sample is almost entirely fluidal sand-sized gray glass fragments with rare broken cpx crystals. Pele's hair and limu or ribbon fragments are present, as are more coarsely vesicular fragments and some altered fragments. No sulfur spherules. In addition to the sand-sized material, three fragments of dense spatter up to about 6 cm and some additional gravel-sized dense spatter are present. Taken upslope from rock-02. Not suspected to be zero age.	geo group
J420-rock-04	geo	S flank	5/12 2009	12	06	-15.100907	-173.755623	7096	15	4	1665	Broke off a fairly small piece of an old pillow that looks like it has a small collapse pit in it. Very glassy. Not suspected to be zero age.	geo group
J420-rock-05	geo	Crest of SW ridge	5/12 2009	12	33	-15.099814	-173.755682	7159	11	3	1563	Rock piece from surface of pillow in area where lava tubes are draped over a cliff. Piece of flat rind off pillow about an inch thick. It is fragile and glass. Looks like an old flow. Lots of sand on top of pillows. This is from right at the ridge crest where turning NE to travel along the ridge. Not suspected to be zero age.	geo group
J420-sed-06	geo	Crest of SW ridge	5/12 2009	12	38	-15.099769	-173.755706	7170	15	1	1560	Scoop sample from a big pile of rippled sand not far from rock-05. Pile of sand has a large pillow draped across the top. This sample is almost entirely fluidal grey glass fragments with rare broken opx, cpx, and ol crystals. Pele's hair and limu like fragments present. No lithics or altered fragments observed. No sulfur spherules. Not suspected to be zero age.	geo group
J420-rock-07	geo	SW Ridge	5/12 2009	12	54	-15.099747	-173.755345	7203	59	7	1537	Rind of broken end of collapsed pillow. Very crumbly. Collected while moving along the ridge crest from the SW toward the NE. Not suspected to be zero age.	geo group
J420-rock-08	geo	SW Ridge	5/12 2009	13	14	-15.099155	-173.754652	7244	240	1	1516	Rock piece that broke off the edge of a large hollow pillow. Has glass rind on one side. Not suspected to be zero age.	geo group
J420-rock-09	geo	SW Ridge	5/12 2009	13	35	-15.098640	-173.754182	7281	44	1	1503	Breaking off edge of collapsed pillow. Nice drips on bottom side. This rock is from a big hollow pillow on the ridge crest. Pillow is about 1 to 1.5 meters across. Not suspected to be zero age.	geo group
J420-rock-10	geo	SW Ridge	5/12 2009	14	25	-15.097277	-173.752187	7397	55	4	1384	Piece broken off the edge of elongate pillow with contents spilling out. SW ridge crest. > 500m to summit. Not suspected to be zero age.	geo group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 sample comments (West Mata)	PI
J420-sed-11	geo	SW Ridge	5/12 2009	14	33	-15.096823	-173.751732	7409	359	2	1369	Scoop of sediment from deposits on top of pillow lavas. This sample is primarily sand-sized gray fluidal glass fragments, with minor broken opx and cpx crystals, some more coarsely vesicular fragments, and limu, ribbons, and Pele's hair. One 4 cm scoria clast was also present and the outer glass surface has broken foam-cell like bubbles. Not suspected to be zero age.	geo group
J420-rock-12	geo	SW Ridge	5/12 2009	14	43	-15.096725	-173.751741	7427	25	6	1363	Pillow bud. Not suspected to be zero age.	geo group
J420-rock-13	geo	SW Ridge	5/12 2009	14	50	-15.096354	-173.751505	7442	31	2	1346	Breaking edge off jumbled sheet/lobate flow. Folded sheet. Very distinctive. Brownish color. Not suspected to be zero age.	geo group
J420-mat-14	bio	Mat Meadow	5/12 2009	15	17	-15.095624	-173.750293	7513	25	3	1276	Scooping up surficial white material. White mat covering smooth sand slope. White material (bacteria) is very thin layer on top of black sands. Temp was 25C. Geological component: Sample is all fine grained with about half being <500 microns and the rest being larger, but none larger than about 1 mm. Mainly fluidal grey glass fragments, with minor broken opx, cpx, and ol crystals. Pele's hair is present, as are lava ribbons, some less vesicular clasts, and spatter like blebs. Rare sulfur blebs are also present. Almost no lithic fragments or coated fragments. Not suspected to be zero age.	bio group
J420-shrimp-15	bio	Luo	5/12 2009	15	58	-15.095360	-173.750425	7574	87	176	1278	Suction shrimp along rock ledge near top of pit. [Preliminary species ID: Chorocaris/Opaepelee sp.] Also suctioned a bit of bacterial mat.	bio group
J419-rock-16	geo	~50m NE of Luo	5/12 2009	16	26	-15.095469	-173.749943	7611	35	3	1263	Pillow with some staining. Zero age?	geo group
J420-rock-17	geo	Along ridge S of Hades	5/12 2009	16	49	-15.094915	-173.749042	7655	30	6	1218	Piece of broken off pillow. Rim of pillow with white stain is pretty crumbly. Rock was on the ridge crest - due S of Hades ~25m. Suspected to be zero age.	geo group
J420-mat-18	bio	Epsilon Mkr-147	5/12 2009	17	12	-15.094257	-173.748593	7716	189	3	1186	Suction white filamentous mat. There is red mat underneath the white mat.	bio group
J420-mat-19	bio	Epsilon Mkr-147	5/12 2009	17	17	-15.094260	-173.748559	7728	188	3	1186	Suction white filamentous mat. Again seeing red beneath the white mat. Cleaned that rock off.	bio group
J420-major-20	fluid	Hades area	5/12 2009	21	23	-15.094375	-173.748893	8267	163	6	1197	Firing major at 2123. Dave wants the gray smoke that is steaming out of the cooling pillows. Watching a pillow flowing down hill. Coming up very slowly. In this white smoke near extruding pillows. Water-rock reactions. Good sample.	fluid group

sample name	type	location	date	hr	min	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 sample comments (West Mata)	PI
J420-major-21	fluid	Hades area	5/12 2009	21	33	-15.094349	-173.748923	8281	180	4	1199	Firing major. Right here where the gray smoke is forming next to new forming pillows. The pillows are not red but are silver-like and new.	fluid group
J420-gtb-22	gas	Hades area	5/12 2009	21	37	-15.094391	-173.748968	8288	180	4	1199	Firing the red gastight (GTB #9) in the same area where we took the last 2 majors - where the gray smoke is forming next to new forming pillows. Fluid wt.(g) = 166.	gas group
J420-molten-lava-23	geology	Hades area	5/12 2009	23	50	-15.094420	-173.748908	8555	220	7	1191	Lava pulled from active pillow. Poked the T-probe into a glowing advancing pillow and got a large bit of molten lava that hardened immediately. Looks like we were about 5m downslope from Hades. Z=1197. Of course it's zero age.	geo group

4.0 NAVIGATION

4.1 *Jason-2* Shipboard Navigation Summary

Akel Kevis-Stirling

Jason Navigators: Akel Kevis-Stirling, Casey Agee, Sean Kelley

No long baseline transponders (LBL) on any dives.

We used the MBARI AUV groups ultra-short baseline (USBL) system. Serial strings for Medea and Jason were fed to the n456 computer through a Moxa box and then converted into imitation DSL LBL strings with phrog2Disp (code written by Jon Howland) and then fed into NAVDISP exactly as LBL would be except through another moxa box.

Overall the USBL nav was pretty good but there was some offset of targets of up to 20m depending on the ships heading. Hans Thomas thinks these were due to a bad SVP when they calibrated the USBL system.

We launched one elevator with a USBL responder on it to do the USBL calibration. We had a new XT6001 elevator transponder on it for releasing. The XT6001 worked ok but it took about 20 minutes to burn with a brand new battery at 9.6v.

The Sharps system, which used to keep track of Medea's position, did not work until the last dive. Transmit code "i" was used because for some reason the system didn't lock up when using this code but did with g and d. We reconfigured the electronics bottle as well.

SITES and ORIGINS

J2-413 West Mata	-15 06.1041	-173 45.4642
J2-414 West Mata	-15 06.1041	-173 45.4642
J2-415 NELSC	-15 24.1720	-174 15.6856
J2-416 NELSC	-15 24.1720	-174 15.6856
J2-417 West Mata	-15 06.1041	-173 45.4642
J2-418 West Mata	-15 06.1041	-173 45.4642
J2-419 West Mata	-15 06.1041	-173 45.4642
J2-420 West Mata	-15 06.1041	-173 45.4642

4.2 Postcruise MBARI AUV *D. Allan B*. Preliminary Bathymetry Data Shift at W Mata

Susan Merle

The bathymetry data at West Mata and NELSC are preliminary, but Dave Clague and Caress were kind enough to allow the use of those data (when appropriate) for many of the maps that appear in this report. When looking at the navigation overlaid on the provided grid it became clear that the West Mata AUV data needed to be shifted to the northwest. To determine that shift 2009 EM300 data was gridded to 20 m resolution and subsampled to 10 m resolution. The best data shift was resolved using features that were visible on both the EM300 and AUV bathymetry together with Jason depths at nav targets (Section 4.4), which are usually seafloor depths obtained while sampling. For these preliminary data the bathymetry at West Mata was shifted 28 meters to the northwest: 12 m west and 25 m north (Fig. 13). The data at NELSC have not been shifted and are very preliminary, with no navigation adjustments made by S. Merle, however, the position of Nautilus vent was very close(<20 m) to the position taken from the Nautilus Minerals Inc. dive log. **None of the dive tracks or Jason targets have been shifted for the maps in this report.** The bathymetry at W Mata was the only shift made.

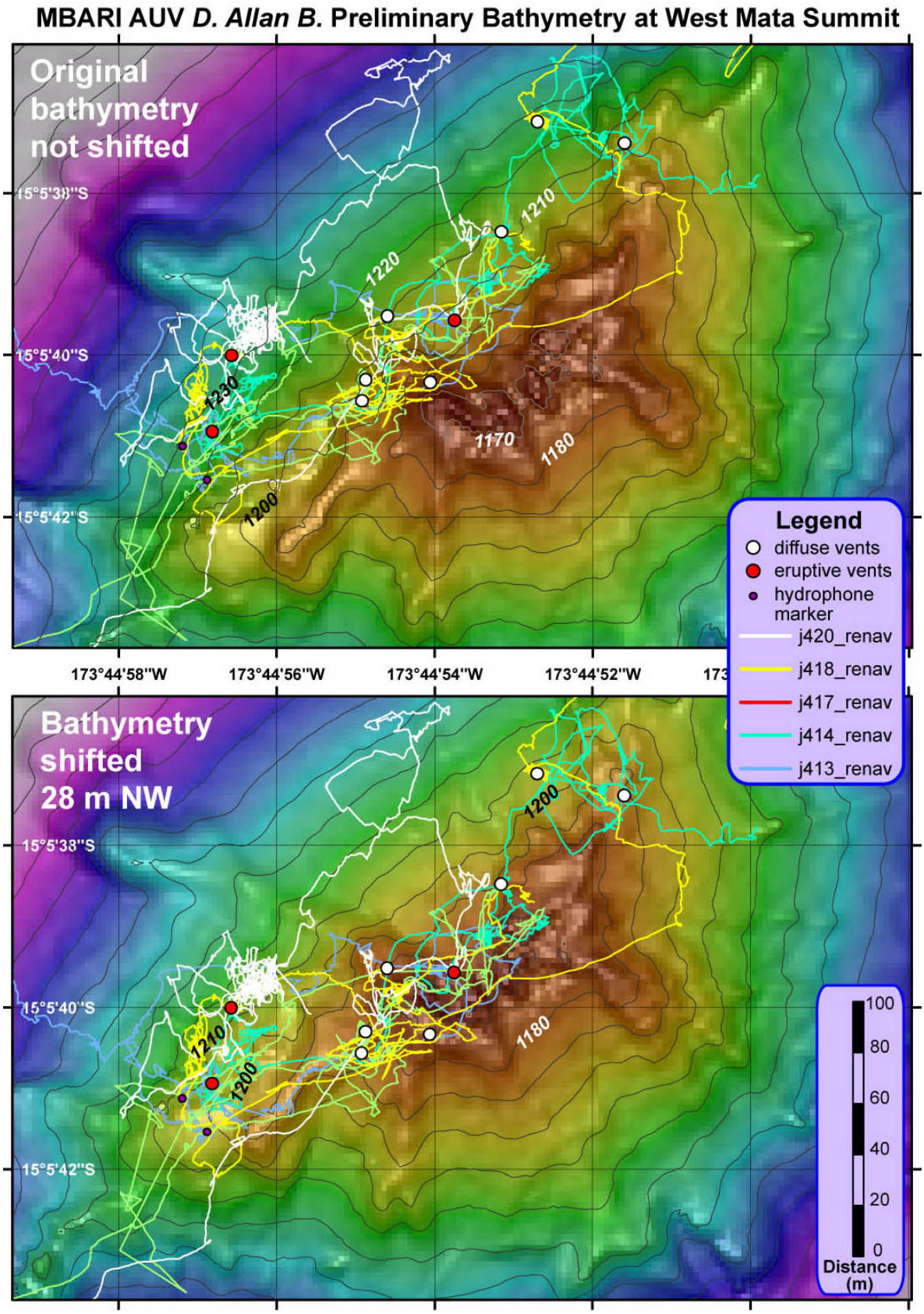


Figure 13. Preliminary AUV bathymetry at West Mata. top) Original bathymetry position. bottom) Bathymetry shifted 28 m to the northwest to agree with EM300 features and Jason vent site depths.

4.3 Jason-2 Postcruise Navigation Summary

Susan Merle

Renav is a Jason filtering software that combines the USBL acoustic nav with Jason's Doppler velocity log (DVL) sonar navigation.. A smoother-looking nav track is the result, but doppler wander usually does get incorporated into the renav positions. The DVL navigation system is very accurate over a short time range, but it does not have an absolute reference frame. When sitting in one spot for a time, or over the course of hours, the DVL can start to drift (wander) and needs to be reset. Those resets can amount to jumps in the navigation of 20m or more. Another DVL weakness is that when Jason gets too far from the seafloor the doppler navigation loses its "bottom lock" and needs to be reset. When at West Mata those doppler resets were usually referenced to the original (J2-413) positions of Hades or Prometheus eruptive vents.

Navigation varied from dive to dive by quite a lot (Fig. 14). As stated in the navigation summary "there was some offset of targets of up to 20m depending on the ships heading". Larger offsets than 20 m were observed for some vents over the course of the dive series at West Mata. In the Hades Area a ~50m spread in the cluster of nav points was observed over 5 dives. At Prometheus a ~40m spread in the cluster of nav points over 3 dives was seen. At Red Rock Ridge a ~30m spread in the cluster of nav points was observed over 3 dives. No nav offsets were seen at NELSC as no nav target sites were re-visited over the course of our 2 dives there.

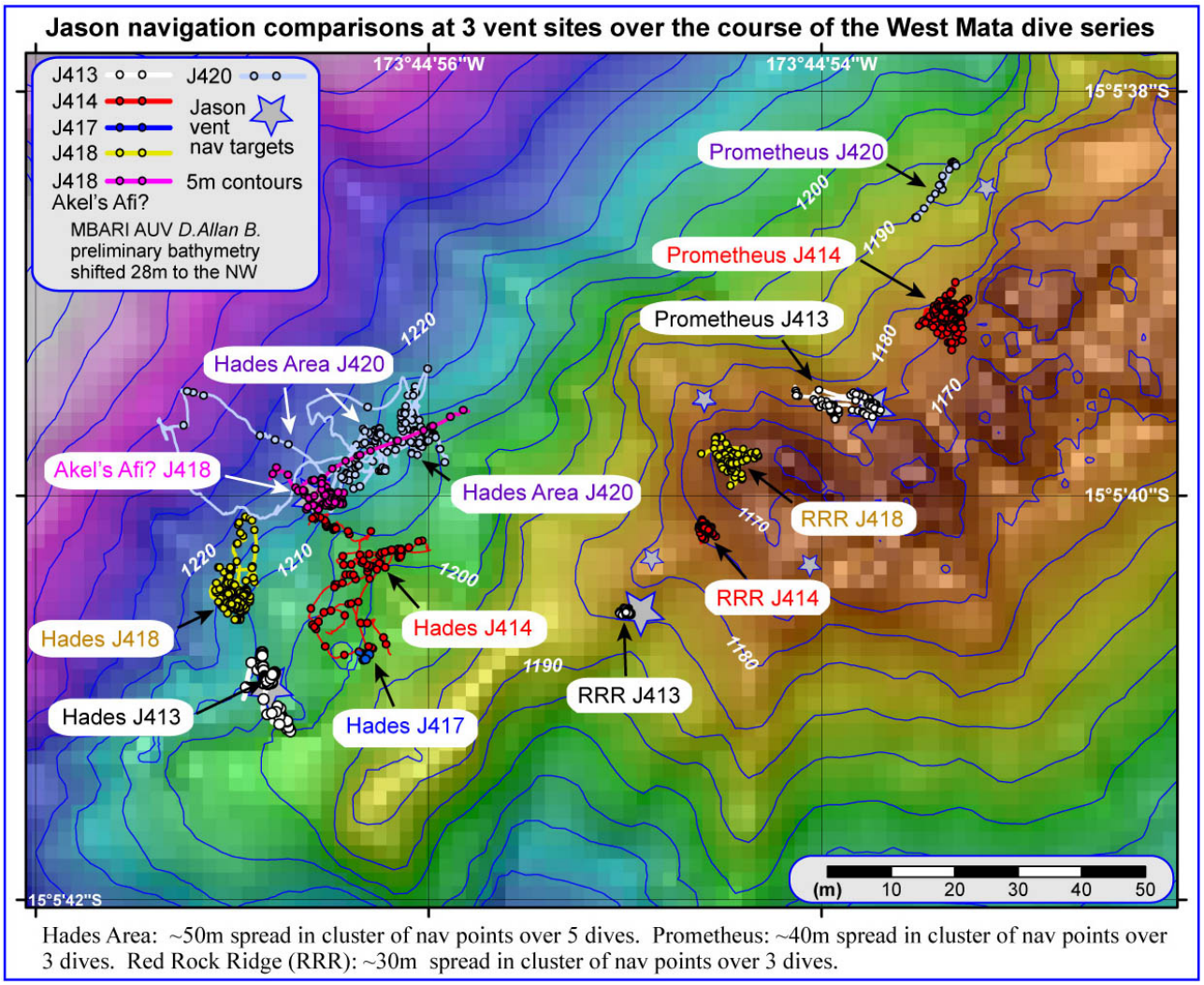


Figure 14. Jason navigation comparisons over the course of the 5 dives at West Mata.

4.4 Jason-2 Navigation Targets

West Mata Vent Targets (See Figs. 3 and 4)

Jason Target	Latitude	Longitude	Dive	Mata Vent Target Comments	Z Jason	Z bathy moved	Z bathy orig
Hades	-15.094707	-173.749115	J413	**Eruptive site.** Position from dive nav varies ~50m over the course of the cruise. (Dives J413, 414, 417, 418, 420). Mkr-147 deployed J413, recovered J414 with the hydrophone. Mkr-49 deployed with hydrophone on J418. Mkr still there. Hydrophone retrieved on J420.	1208	1206	1223
Red Rock Ridge (Mkr-9)	-15.094602	-173.748589	J413	**Diffuse venting.** Position from dive nav varies ~30m over the course of the cruise. (Dives J413, 414, 418) Mkr-9 deployed J418.	1182	1183	1197
White Mat (Mkr-154)	-15.094538	-173.748350	J413	**Diffuse venting.** Difficult to locate. Position from dive nav varies ~30m over the course of the cruise. (Dives J413, 414, 418). Mkr-154 deployed on J413.	1169	1172	1176
Prometheus	-15.094325	-173.748263	J413	**Eruptive site.** Position from dive nav varies ~40m over the course of the cruise. (Dives J413, 414, 420)	1175	1174	1197
Kohu	-15.093718	-173.747666	J414	**Diffuse venting.** Smokey area with diffuse flow. Corrected JasZ targets file was incorrect.	1187	1188	1204
Shrimp City	-15.094023	-173.748098	J414	**Diffuse venting.** Quite a number of shrimp on outcrop.	1182	1187	1210
Mat Meadow	-15.095998	-173.750522	J417	**Diffuse venting.** Very subtle. Huge area of white and orange staining - suspected to be mat and seds.	1280	1281	1278
Luo Vent	-15.095635	-173.750425	J417	**Diffuse venting.** Large hole parallel to the ridge crest with lots of flow.	1279	1277	1278
Epsilon-J417	-15.094530	-173.748575	J417	**Diffuse venting.** Lots of epsilon bacterial mat. First Epsilon position.	1187	1179	1197
Epsilon?-J418 (Mkr-147)	-15.094311	-173.748499	deployed J418	**Diffuse venting.** ~25m N/NE (20°hdg) of Epsilon location on dive J417. Is this the same place as Epsilon-J417? Depths are similar. Probably not the same exact position.	1185	1179	1211
Creamsicle (Mkr-2)	-15.093645	-173.747971	J418	**Diffuse venting.** Outcrop with orange and white staining - probably some bacterial mat.	1195	1206	1226
Akel's Afi	-15.094446	-173.749047	J418	**Eruptive site?** Some speculation about whether or not this is Hades Area or another eruptive vent.[Nav comments (Akel): New Vent target suspect JAS USBL. Could be ~20m east of this position.]	1197	1215	1233

Hades Hydrophone Targets (See Fig. 4)

Hydrophone	Latitude	Longitude	Deployed	Hades Hydrophone Target Comments	Z Jason	Z bathy moved
Mkr-147 B Probe hydrophone	-15.094873	-173.749133	J413	Mkr 147 was recovered on dive J414 with the hydrophone after the first deployment on dive J413. The Jason location for the hydrophone and marker agree well with the AUV shifted bathymetry.	1200.4	1201
Mkr-49 LARa hydrophone	-15.0947572	-173.749219	J418	Mkr 49 was deployed when the hydrophone was put down for the second time (J418). It is still there. The navigation has this in the wrong spot - especially when looking at Jason depths and AUV depth differences. Within 6 minutes, while we were deploying the hydrophone and the marker, the nav wandered ~15m to the S/SW.	1199.3	1210

NELSC Vent Targets (See Fig. 5)

Jason Target	Latitude	Longitude	Location	Dive	NELSC Vent Target Comments	Z Jason
Nautilus vent	-15.383400	-174.244821	NELSC north	J415	**Diffuse venting.** This venting area was discovered before the cruise based on Nautilus dive video.	1612
Subtle shimmer	-15.387482	-174.247627	NELSC north	J415	**Diffuse venting.** 2 degrees above ambient - white mat in area	1582
Marker 148	-15.383125	-174.244674	NELSC north	J415	**Diffuse venting.** Just upslope from tubeworm sample site (J415-15)	1617
Mkr-149	-15.422010	-174.283609	Maka	J416	**High temperature venting.** Marker place at base of large sulfide mound with several black smoker finger chimneys.	1527
Mkr-E tubeworms	-15.422440	-174.284178	Maka	J416	**Diffuse venting.** 50m 280° from sulfide mound at tubeworm sampling site (J416-22).	1542
Mkr-A mussels	-15.422522	-174.284254	Maka	J416	**Diffuse venting.** At site of mussel sampling. (J416-23).	1540
Maka sulfide mound	-15.422191	-174.283780	Maka	J416	**High temperature venting.** Spot of sulfide mound sampling. Samples at sulfide area were within 10m of each other.	~1531

5.0 NELRC DISCIPLINE SUMMARIES

5.1 GEOLOGY

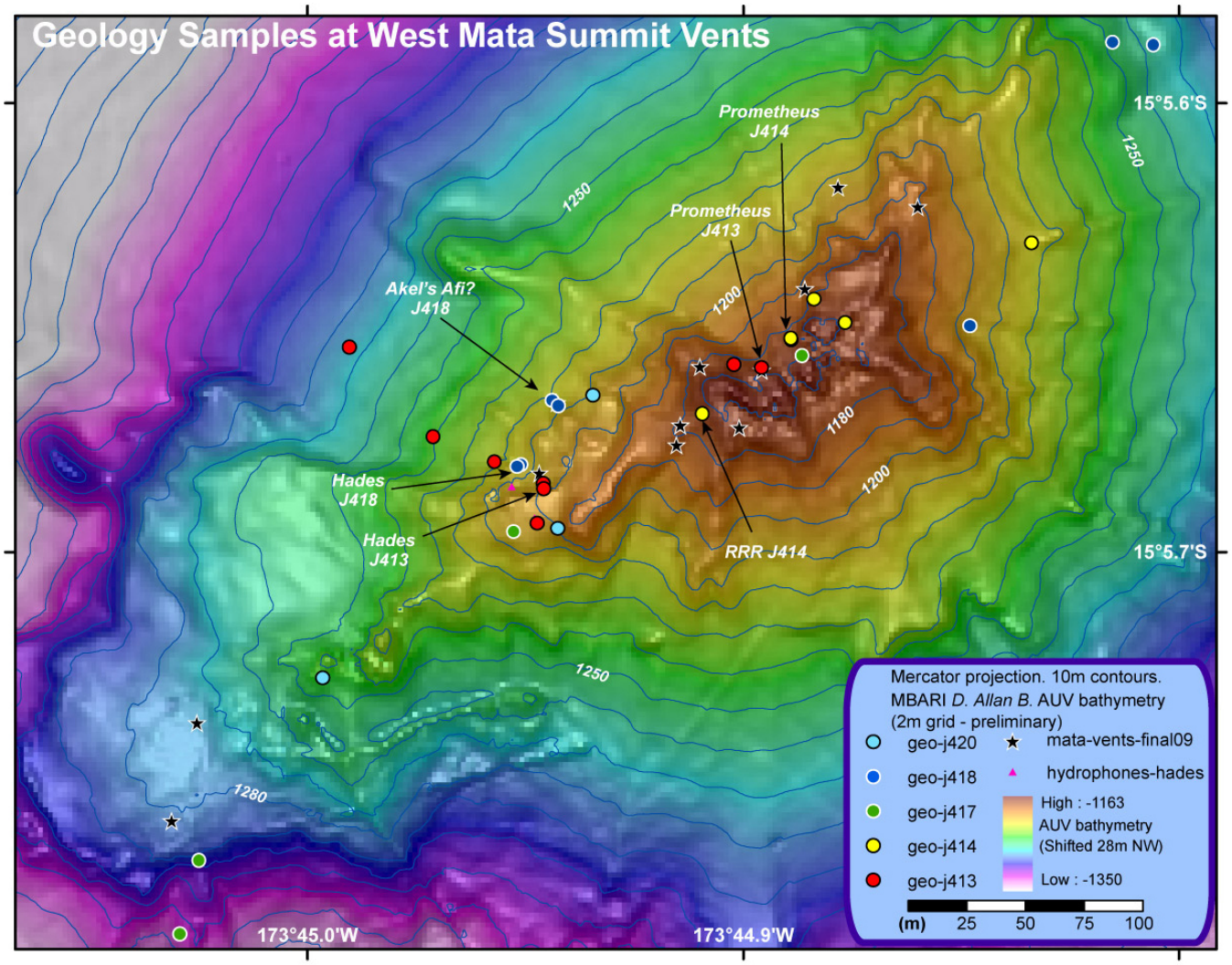


Figure 15. NELRC Geology samples at West Mata summit vents.

5.1.1 Geological Sample Collections and Studies

Ken Rubin (with Nicole Keller, Dave Clague and Bob Embley)

The geological objectives of this program were to discover, characterize and map the extent of young eruption deposits at two study sites (W. Mata Volcano and the Northeast Lau Spreading Center - NELSC), to examine pre-eruption volcanics, and to sample the full range of volcanic materials present, focusing on the youngest materials. Samples were collected to fulfill geochronological, geochemical, petrological and volcanological objectives of participants with approved Ridge2000/Margins Letters of Interest and additional NOAA objectives. This section describes the volcanic rocks. Scoop/sediment sample tabulation and description for volcanological studies is described elsewhere in this report (See sec 3.1.2 Dave Clague's summary).

Volcanic rock samples were collected on all 7 multidisciplinary *Jason-2* ROV dives of this expedition (Figs 6 through 12 and Fig. 15), weighing roughly 220 kg in total. Five dives were at W. Mata volcano and two were on

the NELSC. The dive series was planned on the basis of the best information available at the time, modified as discoveries were made during the expedition, to satisfy as many scientific objectives as possible. The table below provides the geological context for each of the dives; sample statistics and sample details are tabulated at the end of this section.

All of the primary geological objectives were met and a large sample set was collected. Sample details can be found in the table at the end of this section. Individual rock description sheets from shipboard observations will be scanned and made available as a pdf at some future date. Shipboard rock photos are available for download from ftp.soest.hawaii.edu/pub/krubin/LauShipboardRockPics.

Objectives and Targets of the Dive Series

Dive	Location	Geological Objectives	Comments
413	W. Mata Summit	Discovery of active and recently active volcanic sites, geological and hydrothermal sampling.	Active eruption found in first hour on the NW face of the edifice. Two vents were identified ~100m apart (Hades and Prometheus). Multiple rock and sediment samples taken.
414	W. Mata Summit	Additional discovery and mapping hydrothermal and biological sampling, limited rock sampling payload	Geological samples taken from sites of recent and older volcanic activity.
415	NELSC	Discovery of active or recently volcanic sites, geological and hydrothermal sampling.	Recent eruption deposits were encountered at the landing site. This "Puipui" flow was mapped and sampled along the ridge to the NE; no hot or warm water venting was found, onlyu a very diffuse site with dying or dead microbial mat. Sampling was also conducted at the Nautilus low temperature venting site just outside of the Puipui flow margins
416	NELSC	Additional discovery, hydrothermal and biological sampling, limited rock sampling payload	Limited Puipui mapping from dive 415 start point to SW. Geological sampling limited to sediments and older lavas in the area. Jason was moved mid-water to Maka volcano to the south mid-dive, where 2 old lavas were sampled
417	Upper W. Mata SW Rift Zone to Summit	Geological observations, multi-disciplinary sampling. Very limited rock sampling payload	Dive started off of the SW rift zone in steep terrain, and then traversed the rift zone up to the summit, discovering diffuse flow hydrothermal venting sites below the summit and conducting limited geological sampling.
418	W. Mata NE Rift Zone to Summit	Geological observations, rock, sediment, water and biological sampling. Limited available rock sampling payload	Dive started off of the NW rift zone in steep terrain, and then traversed the rift zone up to the summit. Young and old geological samples were taken, as were vent and non-vent biota, and hydrothermal water samples. One traverse of the SE face of the volcano near the summit showed old rocks and no current volcanic or hydrothermal activity.
419/ 420	Mid W. Mata SW Rift Zone to Summit	Geological observations, rock, sediment, and biological sampling, limited water sampling capability.	Dive 419 was aborted near bottom due to electrical problems. Dive 420 followed a similar plan, although the initial target was moved closer to the summit because of lost time. The dive began on the SW flank of the volcano and climbed to intersect the SW rift zone then traversed to the summit to make observations at Hades vents. Young and old geological samples taken.

Sample Handling and Description

All rocks were rinsed in deionized water, dried (in some cases with the assistance of a fan and/or mild heat lamps), photographed, and described by K. Rubin and Nicole Keller. Some glass was chipped from each sample and hand carried to the Univ. of Hawaii after the cruise; the bulk of each sample was later shipped to Hawaii for subsequent distribution and curation.

Sample types, compositions and distributions

The first Jason sample taken on the expedition, a young pillow fragment (only part of the sample is shown.)

A veneer of glass coats crystals in this sample from the Akel's Afi region of the Hades vent complex, producing a botryoidal texture in this 3" fragment

West Mata:

W. Mata volcano has a steep ridge trending NE-SW near its summit. Active volcanic and hydrothermal vents occur on the northwestern face of the volcano at about 1200m water depth. W. Mata was erupting during the expedition. Large water column anomalies measured by the NOAA vents group and a hydrophone record from December to May (recovered on this cruise) indicate that the volcano was very likely erupting for at least the period from Nov'08 to May'09. The volcano appears to produce primarily pillow lavas and pyroclastic/fragmental material. Pillows are moderately to highly vesicular, particularly in their cores. Young lavas and young-appearing volcanic sands/tephra dominate the summit; these include fluidal and fragmental grain forms (see the following clastics section 3.1.2). Older-appearing lava samples were only encountered at the deepest parts of the two rift zones, and on the Southeast side of the summit face. Abundant sands, steep topography, and what might be fairly persistent volcanic activity made it difficult to visually delineate a boundary between clearly younger and less young eruption deposits in the summit area. ^{210}Po dating should prove useful in determining the areal extent of very young materials (up to 2 years old) collected on the expedition.

Most lava samples have 0.5 to 1 cm thick glass rinds that are fresh to only mildly altered. Fresh glass was even recovered from samples taken in areas of abundant microbial mat and/or Fe-staining on the exterior surfaces of lavas (e.g., at "red rock ridge" in the summit region).

Microscope observation indicates that nearly all samples have abundant phenocrysts. Megacrysts (> 1 cm) occur in some rocks, although primarily in samples collected well away from the active summit region. Lime green clinopyroxene is the easiest mineral to spot in hand samples. Not as easy to detect in the hand specimens are yellow-brownish orthopyroxene crystals, which appear to be the dominant mineral phase in most disaggregated samples viewed under a microscope. Pale green to yellowish olivine also occurs in most samples as a phenocryst or microphenocryst phase. All three minerals also occur in volcanic sands collected at various sites around the volcano. Petrographic observations of thin sections, which will occur during summer 2009, will greatly

Photomicrograph of a 1.5 cm long cpx megacryst, taken by handheld digital camera. The crystal was chipped from an older lava .

clarify the content and character of the phenocryst assemblage. Plagioclase was identified in a small number of older samples, primarily as microphenocryst lathes.

Major and minor element analysis of glass samples is underway in Peter Michael's laboratory at U. Tulsa. On average, young W. Mata samples are high magnesium andesites (average SiO_2 = 56 wt%, MgO = 6.4 wt %, Al_2O_3 = 14 wt%, P. Michael, unpublished). Reconstructed whole rock compositions using preliminary mineral compositions and estimated modes point to a boninite magma composition for the current W. Mata eruption. Whole rock chemistry by XRF is planned at U. Hawaii for summer 2009.

NELSC:

Frothy lobate lava from the Puipui flow. Index card is 3" x 5".

The Puipui eruption site of the NELSC produced lavas sitting astride the NE-SW trending ridge axis. The approximate extent of the eruption was determined by a bottom water temperature anomaly recorded on a towed CTD package. The southern terminus of the flow is in a region where the ridge axis takes a slight jog, at what can be called a 3rd or 4th order ridge discontinuity. In the south, the flow was apparently erupted from ridge summit vents situated above the steeper sided western portion of the ridge segment, with local topography playing an active role in lava distribution from there, particularly to the east, where numerous kipukas of older lava were observed within the young flow field. In the northern part of the flow, lavas were dammed to the west by pre-exiting topography (we did not observe the eastern flow boundary north of the southern terminus zone). Lava ponding and subsequent drainout occurred in at least one place, where a lava pillar supporting a lobate crust was observed.. This was at a small saddle along the ridge just south of 15° 23'N, in the central portion of the flow field. Smaller collapses were also found in a few spots along the ridge to the south, including the site of water column anomalies measured in Nov. 2007. The collapses had minor orange and white staining in places, although none of these collapse pits displayed evidence of hot water venting, or significant microbial or macrofauna colonization that is characteristic of near vent collapses in recently erupted lavas on the EPR or JDF. Older lavas sampled outside the Puipui flow boundaries on its southern, western and eastern flanks range from fresh to mildly altered, although all of these contain loosely adhering coatings that are believed to be Mn-rich.. The northern portion of Puipui is nestled against a low temperature hydrothermal site sitting on somewhat older lavas, tentatively referred to as Nautilus vent. The northern terminus and eastern edge of the Puipui flow in the north were not reached on this expedition.

Folded Puipui lava crust. Index card is 3" x 5".

Lavas from the Puipui eruption range from sheet through lobate forms in the south, and lobates to pillows in the north. Lobes that were transitional to pillows were observed in a few distal locations on the steep southwest side of the ridge at the southern region of the flow, beneath the slope-draping lava "curtains" we named this flow for. The samples we collected are all quite vesicular, some almost frothy, with mostly thin glass rinds that are difficult to remove from the more friable mesocrystalline interiors. These lavas are basalts (average SiO_2 = 50.7 wt%, MgO = 6.5 wt %, Al_2O_3 = 15.7 wt%, with high K_2O content of 0.8 wt%; P. Michael, unpublished).

Puipui samples appear to be nearly aphyric, although small cpx, olivine, and plagioclase crystals have been identified in some samples. Some samples contain native sulfur

spherules in vesicles. Older samples of the region contain larger but still relatively few phenocrysts compared to W. Mata.

Further south on the NELSC, the hydrothermal system at Maka volcano appears to have developed on a 50+ m high pile of pillow lavas. One lava sample from well below the summit is old and extensively coated, with a dark, presumably Mn-rich coating, with devitrified glass rinds. A second sample (colonized by tube worms at the active hydrothermal vent site near the summit) is also altered, has Fe stained interiors and quite large (multi cm) interior vesicles.

Geology Sample Summary

Sample Status:
a. rocks glass chips were hand carried and rocks were shipped to Univ. Hawaii; curator: K. Rubin.
b. sediments Most sediment samples shipped to MBARI; curator: Dave Clague. Small archive splits of most (~5%) shipped to Univ. Hawaii.

Overall sample collection stats			
sample type:	**# of samples**		**approx sample mass**
Rocks	52	total collected (Kg)	221
Sediments/small fragments	16	average mass (Kg)	3
Tephra/spatter	6	Actual range (Kg)	0.25-15
Total	74		
Likely age¶:		**Likely young rocks, by site:**	
Young (i.e., ~ zero-age)	21	Mata Young:	14
Not Young	35	NELCS Young	7
Probably not young	3		
Possibly Young	5		
mixed (seds)	10		

Initial, shipboard assessment of the likelihood that a sample is zero age or not.

May 2009 Lau event response rock samples collected with ROV *Jason-2*

Contact Ken Rubin (krubin@hawaii.edu) for sample details.

Age assessment notes:
y = yes, likely to be zero-age
y? = possibly zero age
n? = unlikely to be zero age
n = not zero age
y/n = probably an age mix (for sediments)

Geology Sample List

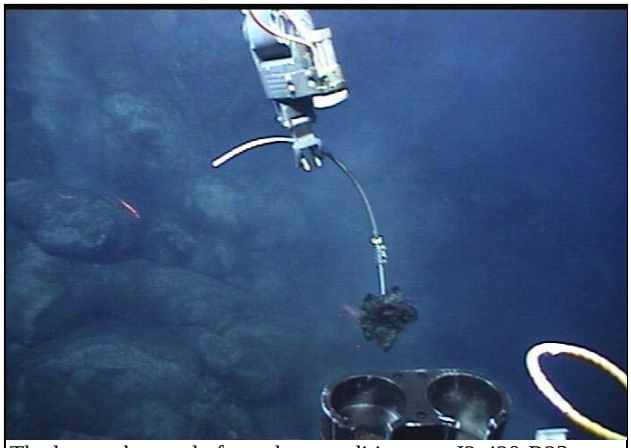
Dive #	Area	Sample name	Collection Site	Water depth	Rock type	approx. mass-Kg	suspect to be zero age?	W °lat	W °long
J2-413	W Mata	J2-413-Rock-01	SW Flank	1279	Pillow	5	n	-15.094	-173.750
	W Mata	J2-413-Rock-02	SW Flank	1247	large sheet fragments	1	n?	-15.095	-173.750
	W Mata	J2-413-Rock-03	SW Flank	1201	Pillow	15	y?	-15.095	-173.749
	W Mata	J2-413-Rock-04	Hades	1208	Scoria/spatter	2	y	-15.095	-173.749
	W Mata	J2-413-Sed-05	20m from Hades	1194	Fragments	15	y	-15.095	-173.749

Dive #	Area	Sample name	Collection Site	Water depth	Rock type	approx. mass-Kg	suspect to be zero age?	W °lat	W °long
	W Mata	J2-413-Bio-09	Near Prometheus	1178	Fragments	0.5	y	-15.094	-173.748
	W Mata	J2-413-Sed-12	Prometheus	1174	Fragments	10	y	-15.094	-173.748
	W Mata	J2-413-Rock-13	Near Prometheus	1174	Scoria/spatter	8	y	-15.094	-173.748
	W Mata	J2-413-Rock-14	Hades	1226	Pillow	5	y	-15.095	-173.749
J2-413	**Rocks 4**	**Seds 3**	**Tephra/spatter 2**						
J2-414	W Mata	J2-414-Rock-01	NW Flank	1220	Pillow	2	n	-15.094	-173.747
	W Mata	J2-414-Rock-12	Shrimp City	1176	Scoria/spatter	2	y?	-15.094	-173.748
	W Mata	J2-414-Rock-22	Prometheus rim	1174	Spatter aggregate?	3	y	-15.094	-173.748
	W Mata	J2-414-Sed-23	Near Shrimp City	1161	Fragments	0.75	n	-15.094	-173.748
	W Mata	J2-414-Rock-27	Red Rock Ridge	1181	Pillow w Fe coating	3	n	-15.094	-173.748
	W Mata	J2-414-Misc. basket	Miscellaneaous	-	Mix	1	y/n	-15.094	-173.748
	W Mata	J2-414-Misc. tephra	Prometheus & Hades	-	Pyroclastic ejecta Fragments	0.2	y	-15.094	-173.748
J2-414	**Rocks 4**	**Seds 1**	**Tephra/spatter 2**						
J2-415	NELSC	J2-415-Rock-01	Landing spot	1681	sheet/lobate	1	y	-15.391	-174.252
	NELSC	J2-415-Rock-02	axis	1661	sheet/lobate	2	y	-15.391	-174.252
	NELSC	J2-415-Rock-03	near axis	1663	sheet/lobate	0.3	y	-15.392	-174.252
	NELSC	J2-415-Rock-04		1669	Sheet flow (w/ Mn coat)	1.5	n	-15.392	-174.252
	NELSC	J2-415-Rock-05	Near offset summit of next segment	1659	sheet/lobate	0.5	n	-15.390	-174.250
	NELSC	J2-415-Rock-06		1654	sheet/lobate	0.5	y?	-15.390	-174.250
	NELSC	J2-415-Rock-07		1626	sheet/lobate	10	y	-15.389	-174.249
	NELSC	J2-415-Rock-08	saddle, edge of collapse	1647	sheet/lobate (sulfer spheres on top)	2	y	-15.386	-174.246
	NELSC	J2-415-Sed-09		1631	Sed on top of jumbled sheet flow	10	y/n	-15.384	-174.245
	NELSC	J2-415-Biorock-12	Near Nautilus vent	1617	Piece of pillow	1	n	-15.383	-174.245
	NELSC	J2-415-Mu-13	Near Nautilus vent	1616	Piece of pillow	3	n	-15.383	-174.245
	NELSC	J2-415-W-15	Near Nautilus vent	1616	Scoria/spatter	0.1	n	-15.383	-174.245
	NELSC	J2-415-W-16	Near Nautilus vent	1616	Sheet flow	0.4	n	-15.383	-174.245
	NELSC	J2-415-Rock-18	After Nautilus vent	1636	Sheet/lobate	5	y	-15.383	-174.243
	NELSC	J2-415-Rock-20	N end of the lava flow	1657	Lobate flow	7	y	-15.382	-174.242
J2-415	**Rocks 13**	**Seds 1**	**Tephra/spatter 1**						

Dive #	Area	Sample name	Collection Site	Water depth	Rock type	approx. mass-Kg	suspect to be zero age?	W °lat	W °long
J2-416	NELSC	J2-416-Sed-01	Landing spot	1815	pushcore sediment	0.5	y/n	-15.389	-174.254
	NELSC	J2-416-Sed-02		1815	volcaniclastic sediment	0.5	y/n	-15.389	-174.254
	NELSC	J2-416-Rock-03		1744	older material	1	n	-15.390	-174.253
	NELSC	J2-416-Sed-04		1744	volcaniclastic sediment	0.5	y/n	-15.390	-174.253
	NELSC	J2-416-Sed-05		1671	volcaniclastic sediment	0.7	y/n	-15.392	-174.252
	NELSC	J2-416-Rock-06	Near summit	1661	ropey sheet, older	10	n?	-15.393	-174.253
	NELSC	J2-416-Rock-07	Top of South Ridge	1644	sheet, older	8	n	-15.394	-174.254
	Maka	J2-416-Rock-08	Landing spot	1595	older pillow	10	n	-15.424	-174.286
	Maka	J2-416-Bio-22	h-therm site	1542	older pillow	2	n	-15.422	-174.284
J2-416	**Rocks 5**	**Seds 4**	**Tephra/spatter 0**						
J2-417	W Mata	J2-417-Rock-01	SW Ridge	1326	older pillow	7	n	-15.096	-173.750
	W Mata	J2-417-Rock-02		1290	older sheet	1.5	n	-15.096	-173.750
	W Mata	J2-417-Mat-03		1285	volcaniclastic sediment	1	y/n	-15.096	-173.750
	W Mata	J2-417-Rock-09	Near Hydrophone	1207	lobate	0.3	y?	-15.095	-173.749
	W Mata	J2-417-Rock-28	Prometheus	approx. 1174	Tephra that landed on vehicle, some rounded	5	y/n	-15.094	-173.748
J2-417	**Rocks 3**	**Seds 1**	**Tephra/spatter 1**						
J2-418	W Mata	J2-418-Rock-01	Landing spot	1563	old pillow	3	n	-15.088	-173.742
	W Mata	J2-418-Coral-02	below NE Rift zone	1493	fresh small rock chunk from coral holdfast	0.05	n	-15.089	-173.742
	W Mata	J2-418-Sed-03	NE Rift zone	1465	volcaniclastic sediment	0.6	y/n	-15.089	-173.742
	W Mata	J2-418-Rock-04	NE Rift zone	1465	pillow, sulfur globules	1.5	n?	-15.089	-173.742
	W Mata	J2-418-Rock-05	NE Rift zone	1369	pillow, some staining	5	n	-15.091	-173.743
	W Mata	J2-418-Rock-06	NE Rift zone	1252	pillow	1	n	-15.093	-173.747
	W Mata	J2-418-Sed-07	NE Rift zone	1240	volcaniclastic sediment	3	y/n	-15.093	-173.747
	W Mata	J2-418-Rock-11	Near summit	1210	stained pillow, no glass	3	n	-15.094	-173.747
	W Mata	J2-418-Rock-18	betw. Hydroph. & Hades	1200	lobate	1.5	y	-15.095	-173.749

Dive #	Area	Sample name	Collection Site	Water depth	Rock type	approx. mass-Kg	suspect to be zero age?	W °lat	W °long
	W Mata	J2-418-Rock-19	betw. Hydroph. & Hades	1200	pillow	1.5	y	-15.095	-173.749
	W Mata	J2-418-Rock-20	Akel's afi	1198	scoria	1	y	-15.094	-173.749
	W Mata	J2-418-Sed-21	Akel's afi	1198	volcanic fragments	2	y	-15.094	-173.749
J2-418	**Rocks 9**	**Seds 3**	**Tephra/spatter 0**						
J2-420	W Mata	J2-420-Rock-01	Landing - South flank	1819	old welded scoria	3	n	-15.103	-173.756
	W Mata	J2-420-Rock-02	South flank	1745	old sheet/lobate	5	n	-15.102	-173.756
	W Mata	J2-420-Sed-03	South flank	1720	volcaniclastic sediment	3	n	-15.102	-173.756
	W Mata	J2-420-Rock-04	South flank	1660	old pillow	0.25	n	-15.101	-173.756
	W Mata	J2-420-Rock-05	SW Ridge	1560	pillow	0.7	n	-15.100	-173.756
	W Mata	J2-420-Sed-06	SW Ridge	1560	volcaniclastic sediment	1	n	-15.100	-173.756
	W Mata	J2-420-Rock-07	SW Ridge	1534	pillow	0.4	n	-15.100	-173.755
	W Mata	J2-420-Rock-08	SW Ridge	1517	pillow	4	n	-15.099	-173.755
	W Mata	J2-420-Rock-09	SW Ridge	1504	pillow	4	n	-15.099	-173.754
	W Mata	J2-420-Rock-10	SW Ridge	1389	pillow	1.5	n	-15.097	-173.752
	W Mata	J2-420-Sed-11	SW Ridge	1370	volcaniclastic sediment	0.35	n	-15.097	-173.752
	W Mata	J2-420-Rock-12	SW Ridge	1364	pillow	3	n	-15.097	-173.752
	W Mata	J2-420-Rock-13	SW Ridge	1346	sheet/lobate	1.5	n	-15.096	-173.752
	W Mata	J2-420-Mat-14	SW Ridge	1277	volcaniclastic sediment	0.5	n	-15.096	-173.750
	W Mata	J2-420-Rock-16	NE of Luo	1264	pillow, some staining	2	y?	-15.095	-173.750
	W Mata	J2-420-Rock-17	SW Ridge	1218	pillow	0.8	y	-15.095	-173.749
	W Mata	J2-420-Rock-23	Hades	1191	Lava pulled from active pillow	0.8	y	-15.094	-173.749
J2-420	**Rocks 14**	**Seds 3**	**Tephra/spatter 0**						

Additional Lava Types and Images



The last rock sample from the expedition was J2-420-R23, pulled from an active pillow lava by the Jason pilot using a T-handle rod. The sample is dangling from the rod. A small bit of glowing lava is visible to the left.

Sample J2-420-R23 as it appeared on deck. The hole left by the sampling rod is visible at the right.

Among the deepest sample collected at W. Mata was an older but relatively fresh pillow fragment from 1800m depth.

This sample of agglutinated volcanic spatter was collected from Prometheus vent at W. Mata volcano.

Close-up of Puipui sample J2-415-R07 showing abundant vesicles and a fresh glass rind.

Delicate lava needles line interior areas of this older NELSC lava from the southern Puipui flow terminus.

5.1.2 Lau Clastic Samples

Dave Clague

Sampling was specifically planned to collect clastic eruption products at the two Lau sites, in anticipation that the eruptions that were detected in November 2008 would have a pyroclastic component. Push-cores, sediment scoop bags and a small 29-jar glass suction sampler were available to sample these anticipated materials. Due to the payload and space limitations on *Jason-2*, the suction sampler was not deployed, and a single push core was utilized during one dive at NELSC. The clastic samples collected were sampled mainly using the scoop bags, but we also recovered pyroclastic glass fragments in the main biologic suction sampler and in several sealable sediment scoops designed to sample for bacterial mats. Two additional samples were deposited in the vehicle during explosions and recovered from the main drawer and from the sleeve surrounding a push core. The clastic deposits at West Mata were in general too coarse grained to be retained in pushcores or to be suctioned into the small suction sampler, leading to the decision to not use valuable real estate and payload on *Jason-2*.

Pyroclastic deposits were sampled at both sites, as were active pyrocalstic eruptions at West Mata. A list of samples with brief descriptions are included in Table 1. The West Mata samples include a variety of primary pyroclasts, particularly from the Hades vent, or a combination of primary pyroclasts and recycled materials that have been altered, abraded, rounded, or had secondary deposits accumulate on their surfaces. We were able to observe specific eruption behaviors such as fire fountains or bubble burst activity, and collect the corresponding clastic eruption products.

At NELSC, the deposits sampled may or may not be associated with the eruptive activity detected in November 2008, as they are widespread and reach significant thicknesses (25 cm length of pushcores) on older substrates. The young flow may have syneruptive pyroclasts on its surface, but this could not be confirmed without utilization of the glass suction sampler, which was not deployed at NELSC during either dive. The clastic samples recovered, mainly using scoop bags, contain mostly scoria or spatter-like fragments, and rare lithic fragments, sulfide fragments, and planktic foraminifers.

Brief Sample Descriptions Postcruise

West Mata Samples

J413-Sed05 This sample is primarily sand-sized grey glass fragments, but spatter fragments as large as 2.5 cm also are present. Limu, ribbons, Pele's hair, and sulfur spherules are common. Broken crystals of opx, cpx and ol are present. Coated or altered fragments are common, as are lithic fragments.

J413-Bio09 This sample includes about 50% coarse (to about 3 cm) spatter fragments with the remainder consisting of broken crystals of opx, cpx, and ol; pyroclasts including rare limu and Pele's hair, altered glass fragments, rare sulfur spherules, and two pink echinoid spines (perhaps contamination from the sampler?). The glass is grey colored.

J413-Sed12 This sample is mainly gravel and coarse sand sized fragments. The largest pebble is about 5 cm across. There is little unmodified primary pyroclastic material present and most glass is fairly dense (~5% vesicles). The sample contains very abundant crystals, about twice as common as in the primary pyroclasts or lava samples. Altered or coated glass fragments are common. Glass is gray colored, thicker pieces grey-brown.

J414-Sed23 This sample includes abundant highly-vesicular spatter clasts as large as 7 cm. The finer portions of the sample are also mainly pyroclastic with spatter fragments, broken crystals of opx and cpx, rare limu o Pele and Pele's hair, and some altered or crystalline rock fragments. S spherules are present but rare. Two gastropod shells (about 2 mm long) are present—one was alive and the other dead when collected. Both are heavily stained with Fe, as are some of the spatter clasts. The glass is gray colored.

J414-Misc The sample is about 70% fresh dense to moderately vesicular spatter, some clasts with smooth surfaces with the remaining 30% altered or dense crystalline lava clasts. These crystalline clasts are more olivine-rich than the glassy fragments. The finer fraction is mostly moderately dense angular glass fragments and broken crystals of opx, cpx, and ol. Some ol is spinel-bearing and others are spinel-free. Rare fluidal glass fragments occur in the finer grain size fraction. The sample had a strong smell of S as it dried out in an oven at 60°C and contained rare S spherules. One yellow echinoid spine is also present. The glass is gray colored.

J417-Mat03 This sample is a real mixed bag. There are abundant primary pyroclasts, including limu o Pele and Pele's hair, but spatter fragments and lithic clasts are also abundant. The lithic clasts include rounded pebbles with all glass abraded. Altered or coated fragments are common and sulfur spherules are present but not common. The glass is pale brown.

J417-Rock28 This sample consists of the material that was deposited in the drawer during a large explosion when *Jason* was sampling water on the edge of the Prometheus vent. The finer sediment fractions is 70% mineral grains of opx, cpx, and ol, in decreasing order of abundance, angular to rounded rock fragments to 4 cm (although larger ones were emptied from the drawer to regain buoyancy), glass fragments that are commonly abraded and rounded, coated and altered glass and crystal fragments, and minor sulfur spherules that are generally pitted. The coarser fractions include abundant rounded lithic clasts, usually with little or no glass remaining, more angular lithic fragments, and smooth moderately-vesicular spatter fragments.

J418-Sed03 This sample is primarily fine grained with about 80% smaller than 500 microns. The finer fraction is mostly fluidal lava fragments and some broken crystals. The coarse fraction is an amazing collection of Pele's hair and limu o Pele, most very thin-walled. A few dense crystalline rock fragments and glass fragments up to about 3 mm size are also present. The glass is pale brown.

J418-Sed07 This sample is almost 100% pyroclasts of light brown glass with rare clinopyroxene crystals. Limu o Pele and Pele's hair are common, as are coarsely vesicular scoria-like fragments.

J418-Sed21 This sample is primarily sand-sized angular glass and opx, cpx, and ol crystal fragments, but angular spatter and lithic clasts as large as 6 cm are also present. Almost none of the glass is fluidal. Sulfur spherules are common, as are coated or altered fragments.

J420-Sed03 This sample is almost entirely fluidal sand-sized gray glass fragments with rare broken cpx crystals. Pele's hair and limu or ribbon fragments are present, as are more coarsely vesicular fragments and some altered fragments. Sulfur spherules are absent. In addition to the sand-sized material, three fragments of dense spatter up to about 6 cm and some additional gravel-sized dense spatter are present.

J420-Sed06 This sample is almost entirely fluidal grey glass fragments with rare broken opx, cpx, and ol crystals. Pele's hair and limu like fragments present. No lithics or altered fragments observed. Sulfur spherules are absent.

J420-Sed11 This sample is primarily sand-sized gray fluidal glass fragments, with minor broken opx and cpx crystals, some more coarsely vesicular fragments, limu, ribbons, and Pele's hair. One 4 cm scoria clast was also present with an outer glass surface with broken foam-cell like bubbles.

J420-Mat14 This sample is all fine grained with ~50% being <500 microns and the remainder being larger, but generally < 1mm. The sample is mainly fluidal grey glass fragments, with minor broken opx, cpx, and ol crystals. Pele's hair, lava ribbons, spatter-like blebs, less vesicular clasts, and rare sulfur blebs are present. Lithic fragments and coated fragments are generally absent.

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J415-Sed09 This sample filled a large scoop bag. The largest fragments reach about 3 cm and are mostly spatter, although a few are more vesicular and could be considered scoria. The largest fraction is in the 1-3 mm size range, with decreasing amounts in the 0.5-1 mm, 0.25-0.5 mm, 0.125-0.25 mm, and 0.063-0.125 size fractions. Almost nothing passed through the 63 mm sieve. The glass is nearly aphyric and is light brown colored. Nearly the entire sample consists of pyroclasts. While limu o Pele and Pele's hair are common, the vast majority of the sample is angular spatter fragments of varying vesicularity. Lithic fragments are very rare and no broken crystals were observed. There are no bacteria strands or foraminifera.

J416-Sed01 This sample is a ~12 cm long pushcore that was subdivided at sea into 4 roughly equal portions numbered from 1 at the top to 4 at the base. The entire core is dominantly glass, but planktic foraminifers and rare diatoms are present in each subsection as well. The character of the coarse glass changes through the core with only rare limu o Pele in the basal portions, increasing up-section. Pele's hair is very rare in the entire core, although more abundant in the fine fractions. The pyroclasts near the bottom are mostly scoria to finely vesicular fragments that approach pumice. There are no obvious flow fragments or other lithic fragments in the core, although some scoria fragments are altered to a white amorphous silica(?). Additional fragments, particularly near the bottom, are coated with brown hydrothermal precipitates, but most glass is fresh throughout the core. The glasses are all light brown in color. Each subsection has about twice as much material in the >500 micron fraction as in the 63-500 micron fraction.

J416-Sed02 This a small scoop sample that consists almost entirely of glass fragments of pyroclastic origin. The largest fragments are cm-sized, but about half the sample is 63-500 microns in size. A significant amount passed through the 63 micron sieve. Limu o Pele fragments are fairly rare and Pele's hairs absent. Some of the fragments are stained reddish brown, but most are fresh. Plnktic foraminifers are common, comprising a percent or so of the bulk sample. The finer fraction contains abundant lava ribbons.

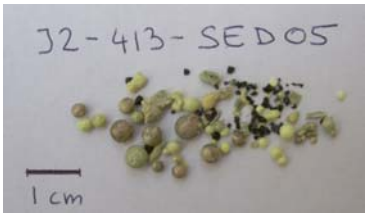
J416-Sed04 This is a small sediment scoop sample that consists almost entirely of glass fragments of pyroclastic origin. Approximately ¾ of the sample is coarser than 3 mm, with the largest fragments being cm-sized. The 63-500 microns fraction is ~5% of the sample. The fine and medium fractions contain abundant bacterial filaments and some planktic foraminifers. Limu o Pele are rare and Pele's hairs absent, except in the fine fraction which has abundant lava ribbons and highly vesicular fragments. The coarser spatter fragments range from nearly dense to almost pumiceous.

J416-Sed05 This is a small sediment scoop sample that consists almost entirely of glass of pyroclastic origin. The largest fragments are about 0.5 cm in size. The 0.5 mm to 3 mm fraction is ~50% of the sample, with about ~25% both finer and coarser grained. Some fragments are entirely encased in smooth glass, rather than the usual broken spatter fragments. Pele's hair is rare and small and limu o Pele-like fragments very rare, but lava ribbons are more common in the finer fraction. The fine fraction contains common bacterial filaments and planktic foraminifers and rare agglutinated benthic foraminifers.

5.1.3 Sulfur Isotopes - Lau Rapid Response Cruise

Nicole Keller

Sulfur isotope ratios in magmatic rocks, fluids and gases have been used in a number of studies as a tool to study sulfur cycling at convergent plate margins. However, the effects of late-stage processes in the upper portion of magmatic systems are poorly understood. Multiple sulfur isotopes (^{32}S, ^{33}S, ^{34}S and ^{36}S) have the potential to record such processes, including magma degassing and fluid-rock interaction in hydrothermal systems. To address these processes all sulfur-bearing phases, including lavas, fluids, gases, native sulfur as well as sulfide chimneys, were collected on this cruise. These samples will be analyzed to determine their multiple sulfur isotope ratios.



Native sulfur globules collected in pyroclastic sediments 20meters from Hades.

The active vent sites discovered on West Mata were discharging significant amounts of sulfur, in the form of sulfur gases as well as native sulfur globules (up to 5 mm in diameter, see image to left), giving a yellow coloration to the eruption plume. Samples collected from the active vents include gases (collected using John Lupton's gas-tight bottles, and extracted from the fluids on board using a vacuum line), fluids (collected by David Butterfield) as well as fresh lava, scoria and sulfur globules. The sulfur gases dissolved in the fluids were extracted on board of the ship to form solid phases (H_2S was precipitated as ZnS, and SO_2 as $BaSO_4$) which where then filtered, to prevent later reequilibration of the isotopes. Several dive profiles were designed to sample older lavas as well as fresh ones, and the collection of samples at regular intervals on the flanks of the volcano will help unravel the eruptive history of the volcano. Three sulfide chimneys, as well as the fluids they were discharging, were collected at Maka on the southern end of the North East Lau Spreading Centre (NELSC).

The numerous and varied samples collected during this cruise in collaboration with other project participants will allow the study of several aspects of sulfur isotope systematics. This includes the effect of degassing on sulfur isotopes by measuring isotope profiles in pillow lavas, from vesicular cores to glassy rinds; if glassy inclusions can be found in phenocryst phases, their volatile and sulfur isotope contents will be determined by Ion Probe. Comparison of the rock isotope data with H_2S, SO_2 and native sulfur globules will establish whether the system is in isotopic equilibrium, and if not, what processes might be occurring at depth. Ken Rubin (University of Hawaii) will be dating all the rocks recovered, which will provide information on the temporal evolution of the isotopic signatures. The combination of sulfur isotope data with helium isotopes (which will be measured in collaboration with John Lupton (NOAA)) will give us insight into the magmatic input of the system. Comparison of the data from this cruise with data from similar sample types from NW-Rota-1 may also show the effect of eruption depth on sulfur isotope fractionation, as the vents at W Mata are 600m deeper than those at NW-Rota-1.
Sulfide chimney samples collected at Maka volcano on the NELSC will be analyzed for sulfur isotopes of the main mineral phases and of the fluids discharged by those chimneys. The microbiology (Anna-Louise Reysenbach, Portland State University), bulk chemistry, and mineralogy (Meg Tivey WHOI) will also be determined for these sulfide chimneys.

5.1.4 Seafloor Hydrophone Deployments at West Mata

Bob Embley

Acoustic records of submarine eruptions have historically been confined to the far-field (100's to 1000's km). Often the source is unknown or ambiguous and it has been difficult to interpret the signals with any certainty because of the lack of direct observations of the eruption site. The first recording of a submarine eruption tied into direct observations of the eruptive processes was made at NW Rota-1 volcano in the Mariana arc in 2006. The data set from the "B-Probe" hydrophone deployed within 40 m of the Brimstone eruptive vent was critical in tying the observations of gas release and explosive fragmentation to a model of the eruption cyclicity (Chadwick et al., 2008). In order to collect this type of data at West Mata, we deployed two small hydrophones (at different times) within 20-30 m of the Hades eruption vent. The "B-Probe" hydrophone was deployed at the end of dive J2-413 and recovered at the end of dive J2-414 (~19h35m recording on seafloor). The "LARA" hydrophone was deployed somewhat closer (~10-15 m) at the beginning of dive J2-418 and recovered at the end of dive J2-420 (~16h recording on seafloor). Unfortunately, the LARA did not record data during dive J2-420 because of a firmware glitch. The most useful data was recorded while the hydrophones were deployed on the seafloor and Jason-2 was at the Prometheus and Hades eruptive vents. This occurred during several intervals on dives J2-413, 414 and 418. The "ground-truthing" of the hydrophone data while Jason-2 was sitting in front of the vents video-taping the eruption processes will allow extrapolation of the longer record when Jason was conducting other observations or was out of the water. It also will facilitate a more realistic interpretation of the ~6 month long record from the moored hydrophone deployed about 35 km to the west (recovered on this cruise). A preliminary look at the hydrophone data confirmed that we had good recordings of the most common types of eruptive behavior at the Hades vent. We do not think that we "heard" the Prometheus eruptive signal because there is a ridge blocking the line of sight from the hydrophone deployment sites.

For hydrophone locations refer to Figure 4 (section 3.2).

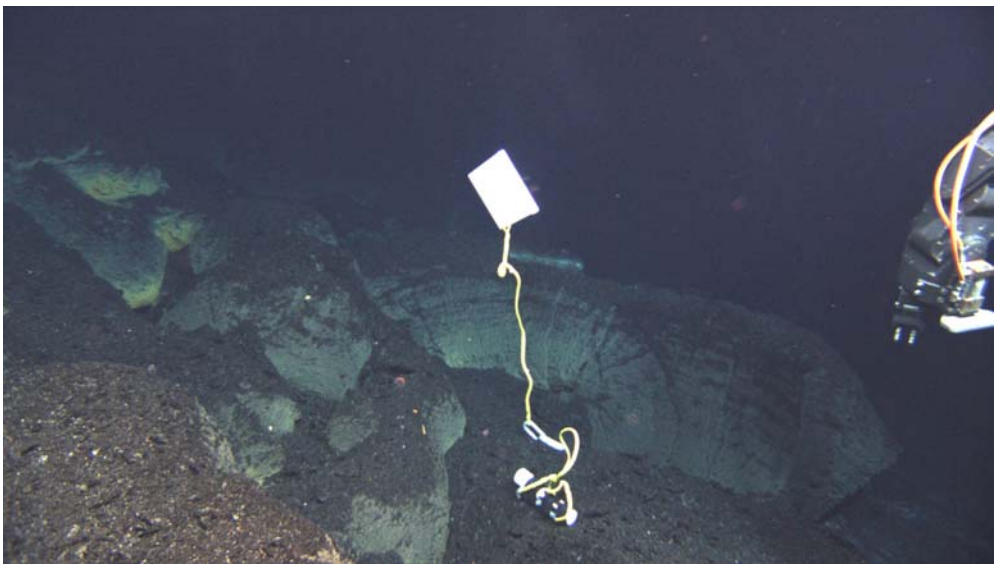
West Mata Hydrophone Log

DateTime	Dive #	Event
	J2-413	
5/6/2009 13:00:00		**B-Probe starts recording**
5/6/2009 14:56:48		JASON in water
5/6/2009 16:05:19		On bottom
5/6/2009 17:10:47		Big vent (Hades) in view!. Observing from here to next entry
5/6/2009 17:50:38		Moving away from vent
5/6/2009 19:53:16		Discovery of Prometheus Vent. Observe this until next entry
5/6/2009 20:42:49		Moving away from Prometheus Vent.
		Some of the time here was spent sampling biology and geology.
5/6/2009 21:59:28		**Deploying B-Probe hydrophone**
5/6/2009 22:04:12		Back at Hades vent
5/6/2009 22:19:44		Off Bottom
5/6/2009 23:18:00		Jason on deck; end Dive 413
	JD-414	
5/7/2009 07:03:37		Jason in water
5/7/2009 08:01:50		Jason on bottom
5/7/2009 12:10:48		NE of Prometheus
5/7/2009 12:38:33		Arrived at Prometheus
5/7/2009 13:32:31		Approaching vent
5/7/2009 14:54:45		Moving away from Prometheus Not all of time in area was Jason directly observing vent
5/7/2009 17:02:24		Jason arrives at Hades
5/7/2009 17:35:56		**Pick up B-Probe Hydrophone**
5/7/2009 17:46:45		Back at Hades
5/7/2009 17:52:38		End Dive JD-414
5/7/2009 19:02:13		Jason on Deck
5/8/2009 00:00:00		**End of B-Probe file**
	JD-418	

DateTime	Dive #	Event
2009/05/11 03:56:26		On the bottom on rift zone NW of summit
2009/05/11 11:41:24		Setting Jason down - good site for hydrophone. 10-20 m S-SW of Hades. Turned out this was too close.. A lot of clipping on the record.
2009/05/11 11:50:06		At Hades Vent
2009/05/11 12:23:00		**LARa hydrophone starts recording**
2009/05/11 13:41:15		Big explosion
2009/05/11 14:04:03		"New" vent, but later found that it is one of several at Hades site
2009/05/11 14:51:44		Getting blown off position by squall
2009/05/11 17:30:44		Prometheus in view relatively calm when compared to yesterday.
		Rest of dive spent on summit ridge ~20 m shallower
2009/05/11 18:05:25		Jason off bottom
2009/05/11 18:55:57		Jason on deck
2009/05/12 04:34:00		**LARa hydrophone stops recording**
	JD-420	
		Note: Dive 419 was aborted before reaching bottom (or shortly thereafter)
2009/05/12 09:41:15		Jason in water
2009/05/12 10:49:03		Jason on bottom z=1860; Down SW rift zone
2009/05/12 17:55:09		Arrived at Prometheus, ~ 10 m away
2009/05/12 18:17:40		Start backing downslope from Prometheus
2009/05/12 19:24:49		Arrived at Hades area. At least 2 active vents close together
2009/05/12 21:57:14		**Recover LARa hydrophone.** Have been observing Hades for most ot this time
2009/05/12 22:35:04		Back at Hades, where we remain until end of dive
2009/05/13 00:01:49		Jason off bottom

West Mata Hydrophone Position Information (also in Navigation section)

Hydrophone	Latitude	Longitude	Deployed	Hades Hydrophone Target Comments	Z Jason
B-probe hydrophone at Mkr-147	-15.094873	-173.749133	J413	Mkr 147 was recovered on dive J414 with the hydrophone after the first deployment on dive J413. The Jason location for the hydrophone and marker agree well with the AUV shifted bathymetry.	1200
LARa hydrophone at Mkr-49	-15.0947572	-173.74922	J418	Mkr 49 was deployed when the hydrophone was put down for the second time (J418). It is still there. The navigation has this in the wrong spot - especially when looking at Jason depths and AUV depth differences. Within 6 minutes while we were deploying the hydrophone and the marker the nav wandered ~15m to the S/SW.	1199



B-Probe hydrophone deployed at Mkr-147, dive J2-413

5.1.5 MBARI Mapping AUV Surveys in the Lau Basin

Dave Caress

High-resolution seafloor mapping of West Mata and the Northeast Lau Spreading Center was accomplished using the Autonomous Underwater Vehicle (AUV) *D. Allan B.* The *D. Allan B.* is a 0.53 m diameter, 6 m long, torpedo-shaped Dorado class AUV designed, constructed, and operated by the Monterey Bay Aquarium Research Institute (MBARI) [Kirkwood et al., 2004, 2005; Kirkwood, 2007; Caress et al., 2008]. This AUV is equipped with three mapping sonars: a 200 kHz multibeam sonar, a 2-16 kHz sweep chirp subbottom profiler, and a dual frequency (110 kHz and 410 kHz) chirp sidescan sonars. The primary goal of the MBARI Mapping AUV missions during TN234 was to obtain high-resolution swath bathymetry of the two eruption sites using the multibeam sonar. In general, the D. Allan B. achieves 1 m lateral resolution bathymetry when operated at a 50 m altitude, and a 1.5 m resolution from a 75 m altitude. The AUV mission duration is 17 hours, including time spent descending to the seafloor at roughly 25 m/minute and ascending from the seafloor at 60 m/minute. The vehicle's inertial navigation system (INS) achieves high navigational accuracy (error less than 0.05% of distance traveled) when it is close enough to the seafloor (~130 m) for the Doppler velocity log to have bottom lock. In order to begin surveys with good navigation, the AUV is tracked from the ship with an Ultra-Short Baseline (USBL) sonar as it conducts a spiraling descent, and an acoustic modem system is used to relay the tracking data to the vehicle.

The MBARI Mapping AUV was deployed five times during TN234. However, the first two missions failed because the inertial navigation system (INS) suffered power glitches as the vehicle reached a depth of about 1000 m. Following the replacement of all the INS power cabling, including a penetrator, the vehicle successfully conducted three missions, one on the NELSC (Fig. 16) and two on West Mata (Fig. 17). Following the cruise, the penetrator was shown to fail under pressure, verifying the shipboard troubleshooting diagnosis.

The AUV data were processed using MB-System [Caress and Chayes, 1996; Caress et al., 2008; Caress and Chayes, 2009]. The primary processing effort involved interactive editing of the bathymetry data and adjustment of the AUV navigation so that bathymetric features match in overlapping swathes within the 1.5 m lateral resolution. The latter was accomplished using the MBnavadjust tool in MB-System that solves for an optimal navigation model once the user has interactively matched features in crossing and overlapping swathes.

Caress, David.W., and Dale N. Chayes, Improved processing of Hydrosweep DS Multibeam Data on the R/V Maurice Ewing, Marine Geophysical Researches, 18, 631-650, 1996.

Caress, D.W., and D.N. Chayes, "MB-System Mapping the Seafloor: Open Source Software for the Processing and Display of Swath Sonar Data", http://www.mbari.org/data/mbsystem/, 2009.

Caress, D.W., H. Thomas, W. J. Kirkwood, R. McEwen, R. Henthorn, E. A. Clague, C. K. Paull, J. Paduan, and K. L. Maier, "High-Resolution Multibeam, Sidescan, and Subbottom Surveys Using the MBARI AUV D. Allan B.", Marine Habitat Mapping Technology for Alaska, J.R. Reynolds and H.G. Greene (eds.) Alaska Sea Grant College Program, University of Alaska Fairbanks. doi:10.4027/mhmta.2008.04

Kirkwood, W. J. 2007. Development of the DORADO mapping vehicle for multibeam, subbottom, and sidescan science missions. J. Field Robot. 24:487-495 doi= http://dx.doi.org/10.1002/rob.v24:6.

Kirkwood, W.J, D.W. Caress, H. Thomas, M. Sibenac, R. McEwen, F. Shane, R. Henthorn, and P. McGill. 2004. Mapping payload development for MBARI's Dorado-class AUVs. Proc. Oceans 2004 MTS/IEEE.

Kirkwood, W.J, D.W. Caress, H. Thomas, M. Sibenac, R. McEwen, F. Shane, R. Henthorn, and P. McGill. 2005. Results from MBARI's Integrated Mapping System. Proc. Oceans 2005 MTS/IEEE.

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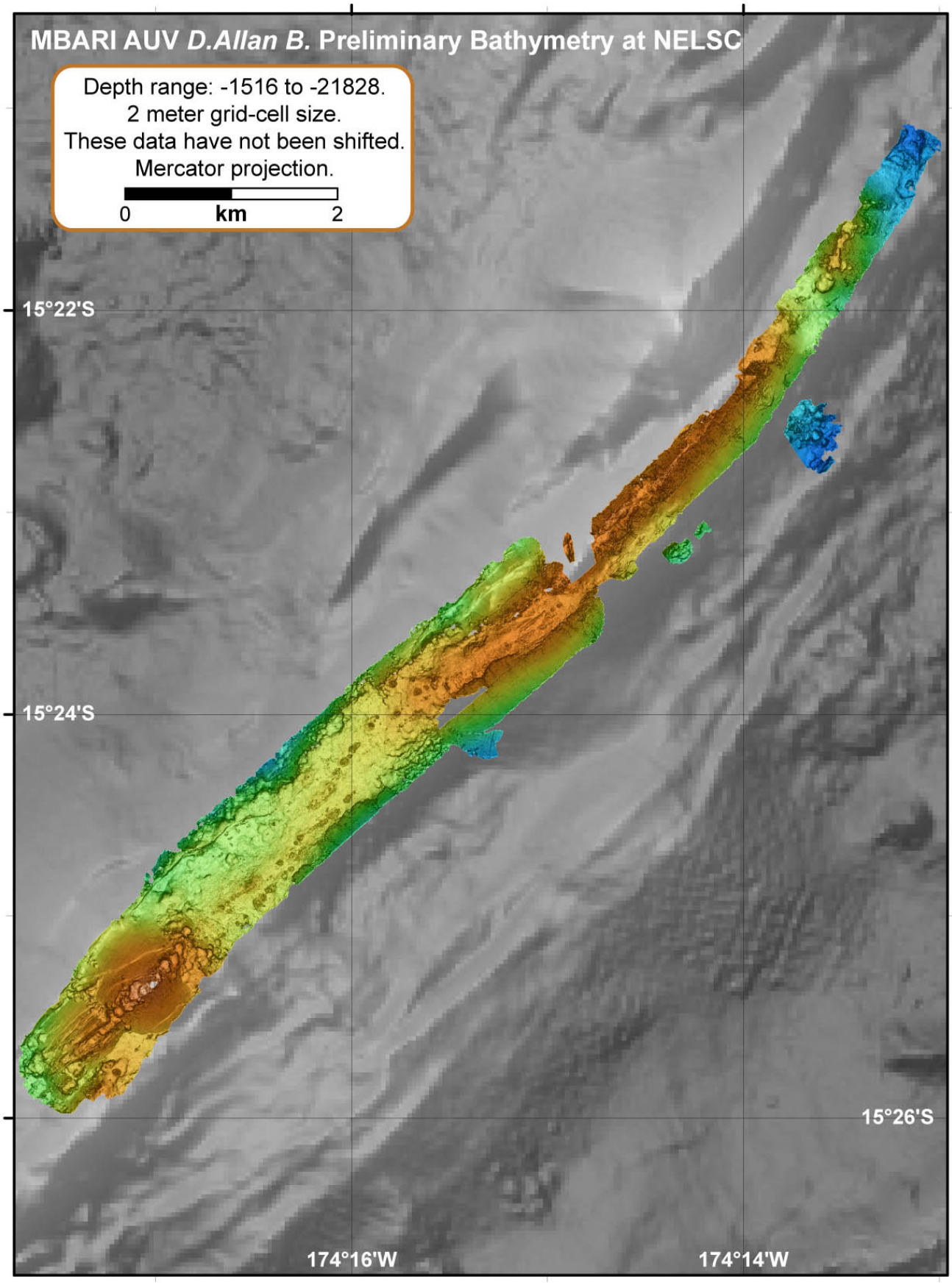


Figure 16. MBARI AUV D.Allan B. preliminary bathymetry at NELSC.

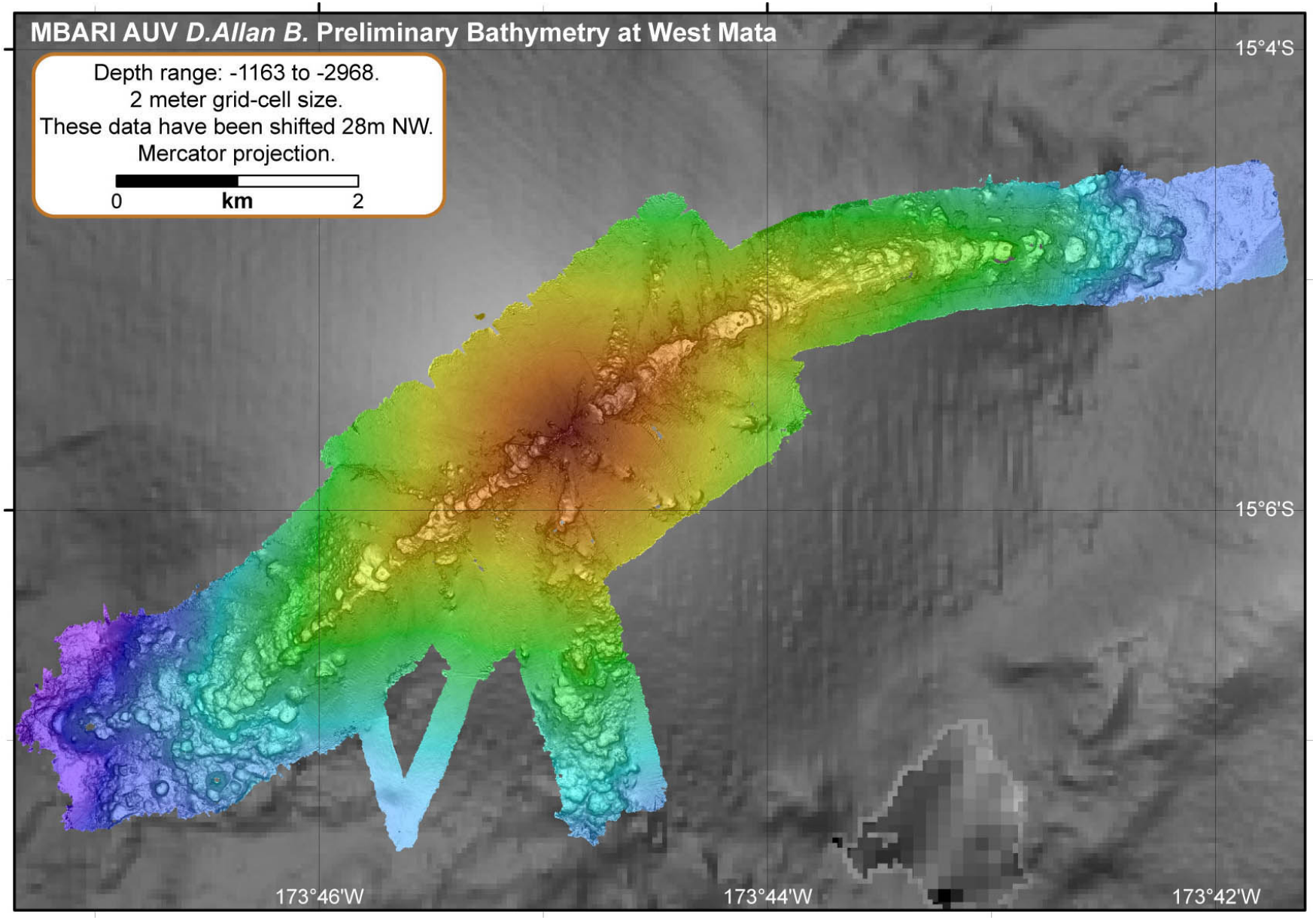


Figure 17. MBARI AUV *D.Allan B.* preliminary bathymetry at West Mata

MBARI Mapping AUV Mission Summaries

Mission 20090507
Site: West Mata
Descent depth: 2644 m
Intended altitude: 50 m
Launch time: 07 May 2009 02:08 UTC
Recovery time: 07 May 2009 05:48 UTC
Synopsis: The AUV aborted the mission during its spiral descent at 942 m depth due to an INS reset following the interruption of power. No mapping data were recorded.

Mission 20090508
Site: NELSC
Descent depth: 1763 m
Intended altitude: 50 m
Launch time: 08 May 2009 00:49 UTC
Recovery time: 08 May 2009 05:15 UTC
Synopsis: The AUV aborted the mission during its spiral descent at 1090 m depth due to an INS reset following the interruption of power. No mapping data were recorded. The INS reset problem was successfully resolved following this mission by replacing the relevant power cabling.

Mission 20090509
Site: NELSC
Descent depth: 1746 m
Intended altitude: 50 m
Launch time: 09 May 2009 00:56 UTC
Recovery time: 09 May 2009 20:30 UTC
Synopsis: The third mission was a 75% success - the AUV performed about half the survey without any problems. Then, while running along a near-vertical slope, the DVL lost bottom lock immediately after getting an altitude value of 38 m, which was above the abort altitude but below the “desired” altitude. Because the AUV control software operates on the last good information, the vehicle went into a steady climb for 25 minutes until the altitude got reset. During this time, the INS was in free inertial mode, and the navigation accrued errors of several hundred meters. The rest of the survey was misplaced on the seafloor and much of the data was collected from altitudes either larger or smaller than desired. The AUV control software was subsequently modified to prevent a reoccurrence of this novel failure mode.
Data Totals:
Number of Records: 109553
Number of Secondary Sidescan Records: 109545
Bathymetry Data (256 beams):
Number of Beams: 28045568
Number of Good Beams: 21438573 76.44%
Number of Zero Beams: 51662 0.18%
Number of Flagged Beams: 6555333 23.37%
Amplitude Data (256 beams):
Number of Beams: 28045568
Number of Good Beams: 21438573 76.44%
Number of Zero Beams: 51662 0.18%
Number of Flagged Beams: 6555333 23.37%
Sidescan Data (0 pixels):
Number of Pixels: 0
Number of Good Pixels: 0 0.00%
Number of Zero Pixels: 0 0.00%
Number of Flagged Pixels: 0 0.00%
Navigation Totals:
Total Time: 15.1696 hours
Total Track Length: 77.6090 km
Average Speed: 5.1161 km/hr (2.7655 knots)
Start of Data:
Time: 05 09 2009 02:30:08.694999 JD129
Lon: -174.2639 Lat: -15.4013 Depth: 1781.9164 meters

Speed: 4.7858 km/hr (2.5869 knots) Heading: 130.9642 degrees
Sonar Depth: 1732.9954 m Sonar Altitude: 48.9210 m
End of Data:
Time: 05 09 2009 17:40:19.148000 JD129
Lon: -174.2409 Lat: -15.3813 Depth: 1639.3595 meters
Speed: 4.8287 km/hr (2.6101 knots) Heading: 222.2694 degrees
Sonar Depth: 1579.9039 m Sonar Altitude: 48.0920 m
Limits:
Minimum Longitude: -174.2951 Maximum Longitude: -174.2146
Minimum Latitude: -15.4329 Maximum Latitude: -15.3501
Minimum Sonar Depth: 1064.1122 Maximum Sonar Depth: 2081.4585
Minimum Altitude: 0.0000 Maximum Altitude: 326.2861
Minimum Depth: 1516.3322 Maximum Depth: 2179.7898
Minimum Amplitude: 48.0000 Maximum Amplitude: 13191.0000

Mission 20090511
Site: West Mata
Descent depth: 1746 m
Intended altitude: 75 m
Launch time: 09 May 2009 00:40 UTC
Recovery time: 09 May 2009 19:25 UTC
Synopsis: The fourth mission successfully covered the summit region of West Mata. The AUV did suffer several altitude aborts (when the vehicle gets too close to the bottom the propeller shuts off and it floats up until the altitude is acceptable), resulting in the survey covering less distance than planned. The altitude control settings were adjusted to reduce the likelihood of altitude aborts in the next mission.
Data Totals:
Number of Records: 98713
Number of Secondary Sidescan Records: 98700
Bathymetry Data (256 beams):
Number of Beams: 25270528
Number of Good Beams: 20542443 81.29%
Number of Zero Beams: 271375 1.07%
Number of Flagged Beams: 4456710 17.64%
Amplitude Data (256 beams):
Number of Beams: 25270528
Number of Good Beams: 20542443 81.29%
Number of Zero Beams: 271375 1.07%
Number of Flagged Beams: 4456710 17.64%
Sidescan Data (0 pixels):
Number of Pixels: 0
Number of Good Pixels: 0 0.00%
Number of Zero Pixels: 0 0.00%
Number of Flagged Pixels: 0 0.00%

Navigation Totals:
Total Time: 14.4161 hours
Total Track Length: 56.8447 km
Average Speed: 3.9431 km/hr (2.1314 knots)
Start of Data:
Time: 05 11 2009 03:21:12.326999 JD131
Lon: -173.760 Lat: -15.1234 Depth: 2599.6956 meters
Speed: 5.1469 km/hr (2.7821 knots) Heading: 120.9450 degrees
Sonar Depth: 2540.7136 m Sonar Altitude: 58.9820 m
End of Data:
Time: 05 11 2009 17:46:10.187000 JD131
Lon: -173.7481 Lat: -15.0955 Depth: 1226.3765 meters
Speed: 1.6517 km/hr (0.8928 knots) Heading: 258.0928 degrees
Sonar Depth: 1161.1882 m Sonar Altitude: 48.9564 m
Limits:
Minimum Longitude: -173.7664 Maximum Longitude: -173.6971
Minimum Latitude: -15.1245 Maximum Latitude: -15.0772
Minimum Sonar Depth: 1121.0205 Maximum Sonar Depth: 2622.4468

Minimum Altitude: 16.0966 Maximum Altitude: 118.6252
Minimum Depth: 1159.0177 Maximum Depth: 2796.7065
Minimum Amplitude: 242.0000 Maximum Amplitude: 11256.0000

Mission 20090512
Site: West Mata
Descent depth: 1746 m
Intended altitude: 75 m
Launch time: 09 May 2009 01:57 UTC
Recovery time: 09 May 2009 21:20 UTC
Synopsis: The fifth mission was a complete success.
Data Totals:
Number of Records: 100116
Number of Subbottom Records: 93319
Number of Secondary Sidescan Records: 100088
Bathymetry Data (256 beams):
Number of Beams: 25629696
Number of Good Beams: 19388144 75.65%
Number of Zero Beams: 31484 0.12%
Number of Flagged Beams: 6210068 24.23%
Amplitude Data (256 beams):
Number of Beams: 25629696
Number of Good Beams: 19388144 75.65%
Number of Zero Beams: 31484 0.12%
Number of Flagged Beams: 6210068 24.23%
Sidescan Data (0 pixels):
Number of Pixels: 0
Number of Good Pixels: 0 0.00%
Number of Zero Pixels: 0 0.00%
Number of Flagged Pixels: 0 0.00%
Navigation Totals:
Total Time: 14.0420 hours
Total Track Length 67.9570 km
Average Speed: 4.8395 km/hr (2.6160 knots)

Start of Data:
Time: 05 12 2009 04:20:50.719001 JD132
Lon: -173.7603 Lat: -15.1236 Depth: 2594.9828 meters
Speed: 5.1504 km/hr (2.7840 knots) Heading: 121.9680 degrees
Sonar Depth: 2522.5723 m Sonar Altitude: 72.4106 m
End of Data:
Time: 05 12 2009 18:23:22.031999 JD132
Lon: -173.7579 Lat: -15.1099 Depth: 2172.0657 meters
Speed: 4.5658 km/hr (2.4680 knots) Heading: 143.8577 degrees
Sonar Depth: 2084.1204 m Sonar Altitude: 87.9453 m
Limits:
Minimum Longitude: -173.7891 Maximum Longitude: -173.6945
Minimum Latitude: -15.1249 Maximum Latitude: -15.0749
Minimum Sonar Depth: 1101.8267 Maximum Sonar Depth: 2864.5017
Minimum Altitude: 30.6246 Maximum Altitude: 128.3896
Minimum Depth: 1157.0210 Maximum Depth: 2966.3562
Minimum Amplitude: 262.0000 Maximum Amplitude: 10100.000

5.1.6 R/V Thompson EM300 Mapping Surveys - TN234

Susan Merle

Seafloor bathymetry data were collected upon reaching Tongan waters on the transit to the operations area, and fortuitously between other operations during the expedition. Both W Mata and the NELSC were re-surveyed (data was collected at both sites in November 2008 during TN227). Surface differencing of the EM300 data will be performed at each site. Small data gaps were filled, but generally most of the area covered on TN234 was already mapped on TN227. MBSystem scripts are used to process the data. At this point the 2009 data have not been cleaned (with mbedit), but a new sound velocity profile has been applied to the data, after discovering that a bad SVP was entered in the data acquisition system. The data were eventually gridded using the F5 option in mbgrid (weighted sonar footprint gridding algorithm). Both the gridding algorithm and new SVP improved the quality of the data dramatically.

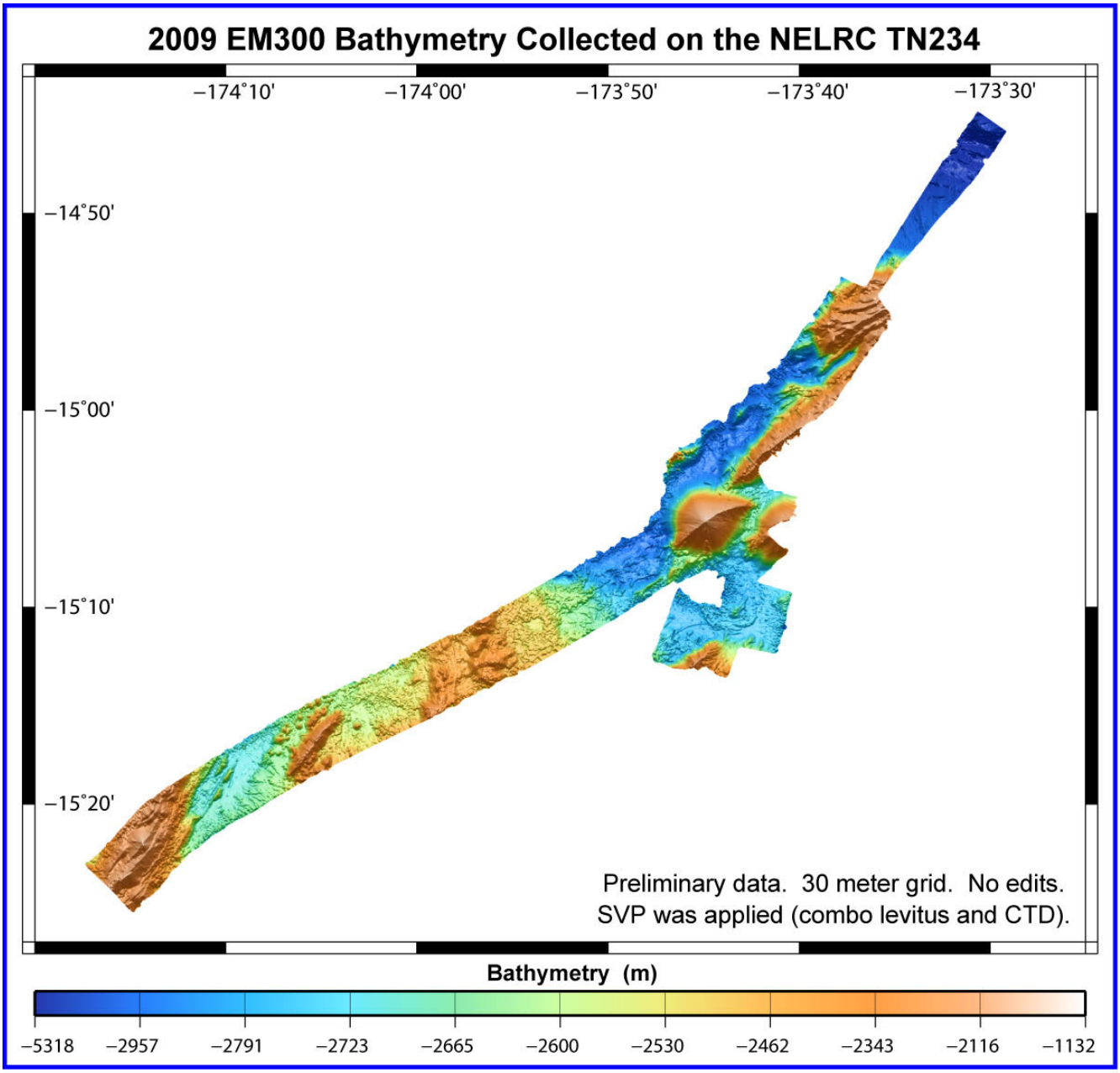


Figure 18. 2009 EM300 bathymetry. NELRC – TN234.

5.2 MACROBIOLOGY

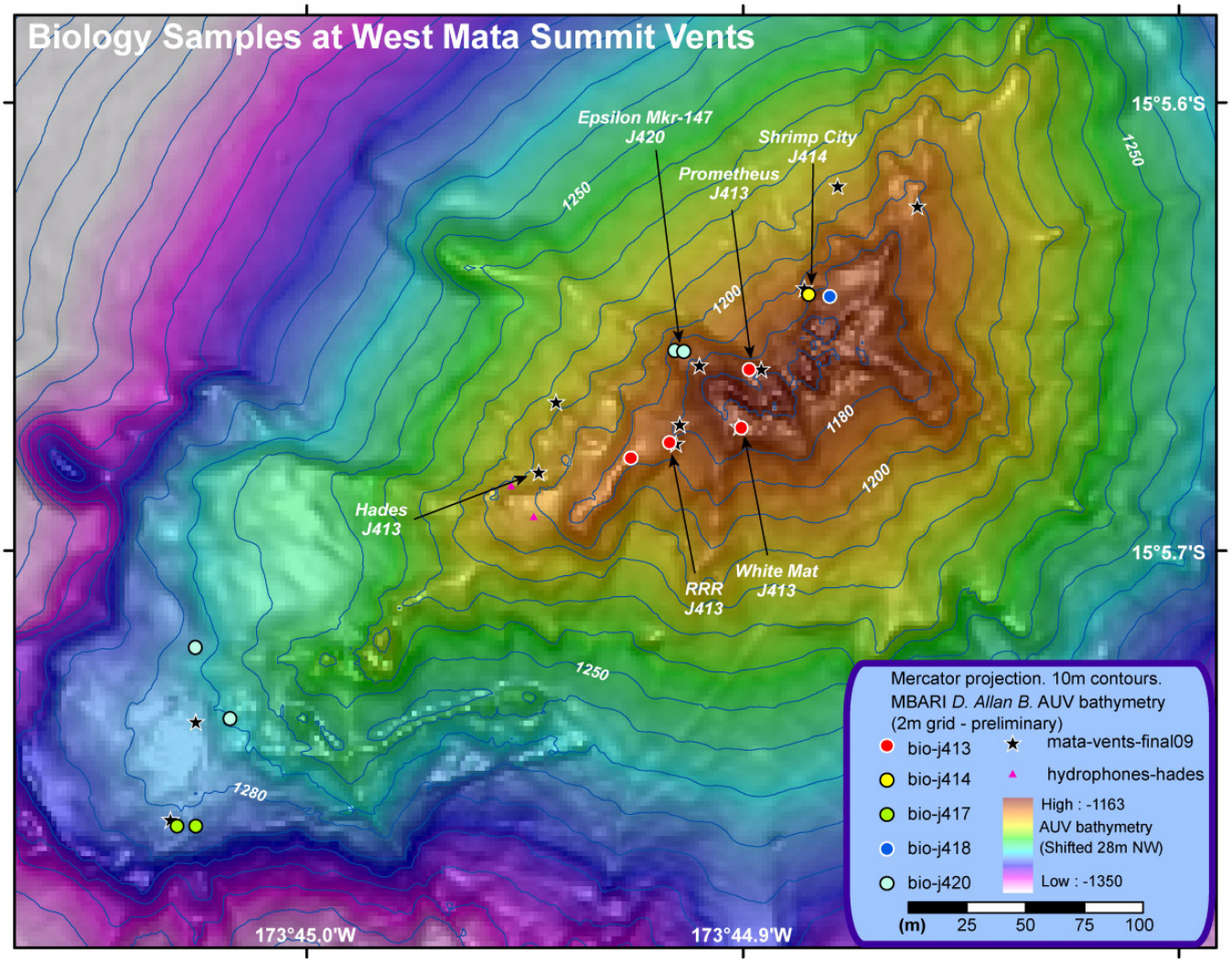


Figure 19. Biology samples (macro and micro) at West Mata summit vents

5.2.1 Biological Sample Collections and Studies

Tim Shank with Liz Podowski

The macro-biological objectives of this program were to discover and characterize the extent of animal communities at two study sites (W. Mata Volcano and the Northeast Lau Spreading Center - NELSC), to examine the character and structure of faunal assemblages both influenced and not influenced by hypothesized eruptive activity in the region, and to sample the full range of biological diversity encountered. Another objective was to document the constituent fauna via high-definition video imagery using *Jason II*. In addition, samples were collected to fulfill the taxonomic, phylogenetic, population genetic, and faunal-symbiont study objectives of participants with approved Ridge2000/Margins Letters of Interest and additional NOAA objectives. All of the primary biological objectives were met and a large sample set was collected. Sample details, including their initial repository location for subsequent disbursement, can be found in the table at the end of this document. This section briefly describes the preliminary biological findings.

West Mata

Exploration of the West Mata Volcano during the first two dives (Figs 6 and 7) yielded active volcanic activity and hydrothermal venting associated with primarily two vents on the central promontory: Hades and Prometheus "vents", from which explosive activity and lava fragmentation, high-temperature venting, and lava flowing downslope were observed. In these "explosive areas" on the crest of the volcano, there was a notable absence of macrofauna. The active and ongoing creation of new seafloor via volcanic activity may prevent the colonization of sessile fauna (and even mobile fauna). Interestingly, the diffuse venting fluids (~5 to 25°C), issuing through cracks and crevices ~15 to 40 m distant from the vents, play host to only one type of vent fauna – Alvinocarid shrimp. Two shrimp morphotypes closely resembled *Opaepele loihi* and *Chorocaris* sp., similar to those inhabiting Mariana vents, seamounts north of Guam and Loihi Seamount off eastern Hawaii. The two shrimp species encountered were abundant (see image to right) (relative abundances to be determined from video following genetic confirmation), apparently grazing on microbes growing on rock surfaces bathed in the clear diffuse venting fluids. Several zoarcid fish were documented within 40 meters of these vents. Sessile fauna were observed ~450 m from the center (Prometheus area) of the venting activity. These included stalked barnacles and octocorals species.

Alvinocarid shrimp near "Shrimp City" on West Mata Volcano

West Mata Sites	Latitude	Longitude	Jason Dive	Biological Observations	Depth (m)
Red Rock Ridge (Mkr-9)	-15.094602	-173.748589	J2-413	Diffuse venting. Shrimp present in relatively high abundance	1182
White Mat (Mkr-154)	-15.094538	-173.748350	J2-413	Diffuse venting. No megafauna observed	1169
Shrimp City	-15.094023	-173.748098	J2-414	Diffuse flow. Largest relative abundance of shrimp in clear diffuse fluids	1182
Mat Meadow	-15.095998	-173.750522	J2-417	Diffuse flow. Very subtle. White and orange staining with no observed megafauna	1280
Luo Vent	-15.095635	-173.750425	J2-417	Diffuse flow. Shrimp on the microbial coated margins and base of a large hole	1279
Epsilon Vent	-15.094530	-173.748575	J2-417	Diffuse flow. Relatively low abundance of shrimp on microbial coated rock faces bathed in flow	1187

NELSC

Traverses over the Nov'08 eruption site confirmed a very young geological "age" for the fresh glassy lavas. The presence of sessile organisms was used as a mapping tool along the lava contact zones. Exploration of the Northeast Lau Spreading Center (Dives 415-416, figs. 8 and 9) yielded two active vent fields: Nautilus vent site and the Maka site. The northern portion of Puipui flow at 15° 22.988'S 174° 14.681'W contained a diffuse flow area first identified prior to the cruise from dive video on loan from Nautilus Minerals Co., with an estimated area of 20m x 20m. Video and (suction, net, rock and faunal grab) sampling during Jason Dive 415 revealed more than 16 species total including: (*Alvinocaris* and *Opaepele*?) shrimp, stalked barnacles, (*Austinograea*) brachyuran

Example of fauna collected from the Nautilus Vent field on the NELSC.

crabs, vent-endemic (*Thermarces* sp. and *Thermobioties*) fish, galatheid crabs, bathymodiolin mussels (with commensal branchypolnoids), gastropod limpets and larger gastropods, polynoid polychaetes, and *Lamellibrachia*-type tubeworms (within habitats up to 17°C). Maximum temperatures were in excess of 19°C within mussel assemblages and as high as 7.5°C amongst the barnacles. Marker 148 was deployed amongst the faunal communities, in a field referred to as Nautilus Vent. The seafloor transect on the second dive (416) going upslope to the Maka vent site, revealed non-vent background fauna to be largely soft corals (chrysogorgid), stalked crinoids, anemones and glass sponges attached to pillow lavas (~1700-1800m). Within 80m of the Maka target, the abundance of shrimp and galatheid crabs increased dramatically. At a depth of 1553 to 1530m, the vent site contained dense clusters of mostly dead tubeworms, many with mussels attached to their tubes. Large numbers of galatheid crabs and zoarcid fish, as well as Alvinocarid shrimp (max temp 12°C), were present at the base and active sides of the chimneys. White and orange microbial staining surrounding the base of the active smoker complex at 15° 23.319'S Long 174 17.017'W (Marker 149) were also observed.

NELSC Sites	**Latitude**	**Longitude**	**Jason Dive**	**Biological Observations**	**Depth (m)**
Nautilus vent Mkr-148	-15.383400	-174.244821	J2-415	tubeworms, mussels, shrimp, crabs, gastropods, fish,	1612
Subtle shimmer	-15.387482	-174.247627	J2-415	White microbial mats; few fauna	1582
Mkr-149	-15.422010	-174.283609	J2-416	Black smoker chimney complex on mound dominated by shrimp and gastropods and mussels at the base	1527
Mkr-E	-15.422440	-174.284178	J2-416	Diffuse flow with extensive tubeworm communities-mostly dead.	1542
Mkr-A	-15.422522	-174.284254	J2-416	Diffuse flow with extensive mussel communities	1540

List of collected fauna by unique identification number, preliminary identification, site, collection ID#, and the initial post-cruise distribution of the samples prior to disbursement to those researchers with approved Ridge2000/Margins Letters of Interest.
* archinome to Shank; **mussel commensals

Unique ID	Preliminary Specimen ID	Jason Dive (s)	Bio #	Jason Sample #	Location	Site	Initial Distribution
150	*Alvinocaris* sp.	J415	#10	**(J415-10)**	NELSC	Mkr 148	Shank
Bulk	*Archinome* sp.	J415	#11	**(J415-10)**	NELSC	Mkr 148	Shank
222-231	*Austinograea* sp.	J415	#11	**(J415-11)**	NELSC	Mkr 148	Shank
111	*Austinograea williamsi*	J415	#10	**(J415-10)**	NELSC	Mkr 148	Shank
703, 776	Bacterial mat	J420	#15, 18	**(J420-15, J420-18)**	West Mata	Luo, Epsilon	Shank
414, Bulk, 687	Barnacles	J415, 418	#2, 11, 15, 16, & Rock #4	**(J415-02, J415-04, J415-11, J415-15, J415-16)**	NELSC, West Mata	Periphery & Mkrs 148, 145	Shank
369-373	Barnacle morph1	J415	#12	**(J415-12)**	NELSC	Mkr 145	Shank
380-384, 397-398	Barnacle morph 2	J415	#12	**(J415-12)**	NELSC	Mkr 145	Shank
390-396	Barnacle morph 3	J415	#12	**(J415-12)**	NELSC	Mkr 145	Shank
385	Barnacle morph 4	J415	#12	**(J415-12)**	NELSC	Mkr 145	Shank
211, 329, 686	*Bathymodiolus* sp.	J415, 416	#13, 23, 15, 16	**(J415-13, J415-15, J415-16, J416-23)**	NELSC	Mkrs 148,A,145	Fisher
685	*Branchinotogluma* sp.	J416	#22	**(J416-22)**	NELSC	Mkr A	Fisher
345-346	Branchipolynoe**	J416	#23	**(J416-23)**	NELSC	Mkr A	Fisher
1, 283-309, 399, 691	*Chorocaris* / *Opaepele* sp.	J413, 415, 418, 420	#9, 11, 30, 15	**(J413-9, J415-11, J418-30, J420-15)**	West Mata, NELSC	near Prometheus, Mkr 148, ShrimpSuburbs, Luo	Shank
127	*Eosipho* sp.	J415	#11	**(J415-11)**	NELSC	Mkr 148	Shank
Bulk	Gastropods	J415	#10-16	**(J415-10, J415-11, J415-12, J415-13, J415-14, J415-15, J415-16)**	NELSC	Mkr 148, 145	Shank
191	Hydroid	J415	Rock #4	**(J415-4)**	NELSC	n/a	Shank
Bulk	Limpets	J415		**#11,15-16 (J415-11, J415-15, J415-16)**	NELSC	Mkr 148	Shank
120,213,347 -361,680	*Munidopsis* sp.	J415, 416, 417	#10, 11, 23	**(J415-10, J415-11, J416-23)**	NELSC, West Mata	Mkrs 148, A & rock dredge	Shank
411-413	octocoral	J418		**#2 (J418-2)**	West Mata	periphery	Shank
Bulk	Polychaetes	J415	#10-16	**(J415-10, J415-11, J415-12, J415-13, J415-14, J415-15, J415-16)**	NELSC	Mkr 148	Fisher*
Bulk	Scaleworms	J415	#11, 12, 15, 16	**(J415-11, J415-12, J415-15, J415-13, J415-14, J415-15, J415-16)**	NELSC	Mkr 148, 145	Fisher
688	Sponge	J415	Rock #4	**(J516-04)**	NELSC	Mkr 145	Fisher
109	*Thermarces* sp.	J415	#10	**(J415-10)**	NELSC	Mkr 148	Shank
110	*Thermobioties mytilogeiton*	J415	#10	**(J415-10)**	NELSC	Mkr 148	Shank
368	Tubeworm rock	J415	#15-16	**(J415-15, J415-16)**	NELSC	Mkr 145	Shank
365-367	Tubeworm rocks	J415	#15-16	**(J415-15, J415-16)**	NELSC	Mkr 145	Fisher
689-690	Tubeworm trophosome	J416	#22	**(J416-22)**	NELSC	Mkr A	Fisher
312-315,317-318	Tubeworms	J415, 416	#15-16, 22	**(J415-15, J415-16, J416-22)**	NELSC	Mkrs 148,E	Fisher
151	*Vulcanolepas* sp.	J415	#10	**(J415-10)**	NELSC	Mkr 148	Shank

5.3 MICROBIOLOGY

5.3.1 Eruptive Fluid Microbiology

Julie Huber

The driving hypothesis for the microbiological examination of West Mata and NE Lau eruption fluids is that novel microorganisms can be detected in event plumes and newly-formed vents and serve as tracers of a warm, anoxic subseafloor habitat. Seafloor eruptions provide one of the most direct points of access to this ubiquitous but understudied habitat. Previous work at mid-ocean ridges shows that as post-eruption fluids evolve chemically, subseafloor microbial communities also experience shifts in their population structure and diversity. Therefore, timely sampling of plume and venting fluids from these sites will provide key information regarding the extent and state of the eruptive event and the subseafloor microbial community.

Microbial work on the eruptive fluids focuses on linking descriptions of microbial communities and their associated metabolic capacity with geochemical processes in eruptive vent fluids. Diffuse fluids and plumes from W. Mata and NELSC were sampled for quantification of microbial communities, enrichment culturing of mesophilic, thermophilic, and hyperthermophilic anaerobic microorganisms, and molecular-based analyses (DNA and RNA) to describe the microbial community structure and metabolic potential and activity. The main sampling device used was the Hot Fluid and Particle Sampler (HFPS; D. Butterfield), which was used to filter fluids through Sterivex filters for DNA and RNA, as well as collect unfiltered fluids for other chemical and microbial analyses. No eruptive fluids were found at NELSC, although one sample was taken from the Maka site. The diffuse fluids found at West Mata ranged in temperature from ~ 15-30 ºC. At some sites, no macrobiology and minimal microbial mat were seen, an unusual state for a hydrothermal vent. We hypothesize this is due to the extremely low pH (<3) of the emitting fluids. Extracted DNA and/or RNA will be used to determine the range of genetic diversity and metabolic potential and expression of microorganisms in the fluids. Total cell numbers will be determined by microscopic counts of preserved fluids, and relative ratios of archaea and bacteria will be determined by quantitative PCR. Media design was based on acidophiles, anaerobic sulfur reducers, and hyperthermophilic archaea. Preliminary culturing results indicate that we were able to enrich at least two cultures from NELSC diffuse fluids, but as of cruise end, we had no positive enrichments from W. Mata. All tubes, both putative negative and positive, will be confirmed microscopically. Any positive enrichments will be purified and characterized to determine their phylogenetic and physiological characteristics.

In all, we collected 20 samples for culturing, counts, and molecular analyses: 16 from the HFS, 1 from the major samplers, and 3 from CTD casts. This suite of samples and the combination of culturing, quantification, and molecular-based analyses along with geochemistry will allow us to begin our examination of the subseafloor microbial community at West Mata and how it responds to the on-going dynamic eruptive process.

Culture = whole fluids inoculated into anaerobic culturing media, incubated at 37, 55, 70, or 85 C, and subsequently stored at 4 C
Counts = whole fluids preserved in 3.7% formaldehyde and stored at 4 C
RNA/DNA = filtered fluids preserved with RNALater and stored at -80 C

Eruptive Fluid Microbiology Sample List

My Samp #	Dive Samp #	Dive	Port/ Btl #	Culture	Counts	RNA/ DNA	Type	Site	Vent	Z	T max	T avg	Vol. (ml)
FS679	J414-HFS-03	J2_414	24	X	X		Unfiltered Bag	W Mata	Kohu	1188	30.8	30.4	459
FS680	J414-HFS-06	J2_414	15			X	Sterivex	W Mata	Kohu	1188	31.6	29.8	3002
FS681	J414-HFS-08	J2_414	23	X	X		Unfiltered Bag	W Mata	Shrimp City	1182	14.9	14.8	501
FS682	J414-HFS-10	J2_414	14			X	Sterivex	W Mata	Shrimp City	1182	14.8	14.6	3002

My Samp #	Dive Samp #	Dive	Port/ Btl #	Culture	Counts	RNA/ DNA	Type	Site	Vent	Z	T max	T avg	Vol. (ml)
FS683	J415-Major-14	J2_415	Green	X	X		Green major	NELSC	Marker 148	1616	20.1		NA
FS684	J417-HFS-05	J2_417	21		X		Unfiltered Bag	W Mata	Luo	1278	22.4	21.5	550
FS685	J417-HFS-06	J2_417	15			X	Sterivex	W Mata	Luo	1278	22	20.2	3002
FS686	J417-HFS-10	J2_417	22		X		Unfiltered Bag	W Mata	Epsilon	1190	29.6	28.1	unknown
FS687	J417-HFS-13	J2_417	14			X	Sterivex	W Mata	Epsilon	1187	30.5	26.2	3002
FS689	J417-HFS-18	J2_417	24		X		Unfiltered Bag	W Mata	Prometheus	1174	13.4	7.2	331
FS688	J417-HFS-25	J2_417	1		X		Unfiltered Piston	W Mata	Hades	1203	48.8	40.2	365
FS692	J418-HFS-10	J2_418	15			X	Sterivex	W Mata	Creamsicle	1195	29.2	29	3002
FS693	J418-HFS-08	J2_418	21		X		Unfiltered Bag	W Mata	Creamsicle	1195	29.3	29.1	550
FS694	J418-HFS-12	J2_418	1		X		Unfiltered Piston	W Mata	Hades		58.1	48.3	425
FS695	J418-HFS-23	J2_418	6		X		Unfiltered Piston	W Mata	Akel Hell	1198	26.7	23	475
FS690	J418-HFS-27	J2_418	14			X	Sterivex	W Mata	Red Rock	1180	14.6	8.8	3050
FS696	J418-HFS-31	J2_418	22		X		Unfiltered Bag	W Mata	Near Shrimp City	1176	19.3	18.9	403
CTD065_JH		V09-C01	16	X	X	X	Sterivex from CTD	W Mata	Prometheus Plume	1096			7500
CTD066_JH		V09-C01	10		X	X	Sterivex from CTD	W Mata	Out Plume	1000			5000
CTD067_JH		T09C-01	23		X	X	Sterivex from CTD	NELSC	Background SW	1300			5500

5.3.2 Microbial Mats

Rick Davis

Microbial mats were found at multiple sites on West Mata at both focused low-temperature vent sites and at diffuse hydrothermal seeps that covered tens to hundreds of square meters. Focused hydrothermal vents at Red Rock Ridge, Epsilon Vent, and Creamsicle Vent (Fig. 4) had white filamentous microbial mats draped over the vent orifice and red microbial mats further away from the focused flow. Other vents such as White Mat Vent, Luo Vent, and Shrimp City (Fig 3) had only white mats which were grazed upon by indigenous hydrothermal shrimp. White and red microbial mats were observed covering large expanses of pyroclastic sediment in areas of diffuse venting. The most striking example of these mats was observed at Mat Meadow which covered an area of hundreds of square meters.

Mat samples were collected from vent sites using the multi-suction sampler fitted with 202 micron nytex screening on the exhaust ports. Sediment samples were collected using a water-tight resealable scoop which was sealed before the dive using aseptic technique and resealed after sampling to prevent contamination by the water column. The majority of the mat material was quickly frozen at -80°C on the ship. Sub-samples o f the mats were preserved for electron microscopy and fluorescent *in situ* hybridization work. Further sub-samples were preserved for future RNA extraction and culture innoculation.

Sample Key

Frozen -80=Freeze the sample at -80 degrees Celsius for DNA/RNA preservation.
FISH = Microscopic analysis using fluorescent in situ hybridization with group specific oligonucleotide probes.
Em = Preserved for electron microscopy with gluteraldehyde.
Cryos = Fast frozen in ~30%glycerol as preservation for culturing. Stored in 2.0 ml cryovials at -80°C.

Microbial Mat Sample List

Dive	Site	Name	Temp °C	Type	Frozen -80°C	FISH	Em	Cryos	Description
J2-413	Red Rock Ridge	J2-413 Blue	25	Suction Sample	7	2	2	2	White mat at Red Rock Ridge
J2-413	White Mat Vent	J2-413 Green	21	Suction Sample	4	2	2	2	White filamentous mat
J2-413	Near Summit	J2-413 Red	23	Suction Sample	3	0	0	0	Pyroclastic glass coated with white mat material
J2-414	Red Rock Ridge	J2-414 R27	25	Mat on Rock	1	2	1	0	Red mat coating rock
J2-414	Near Shrimp City	J2-414 S1	25	Scoop Sample	4	0	2x15cc	0	Stained pyroclastic glass
J2-420	Epsilon Vent	J2-420 Red Green	31	Suction Sample	7	2	2	2	White filamentous mat
J2-420	Mat Meadow	J2-420 S1	25	Scoop Sample	5	2	2	2	White bacteria on black rocks

5.3.3 Active Sulfide Sampling for Molecular and Microbial Culturing Purposes

Anna Louise Reysenbach

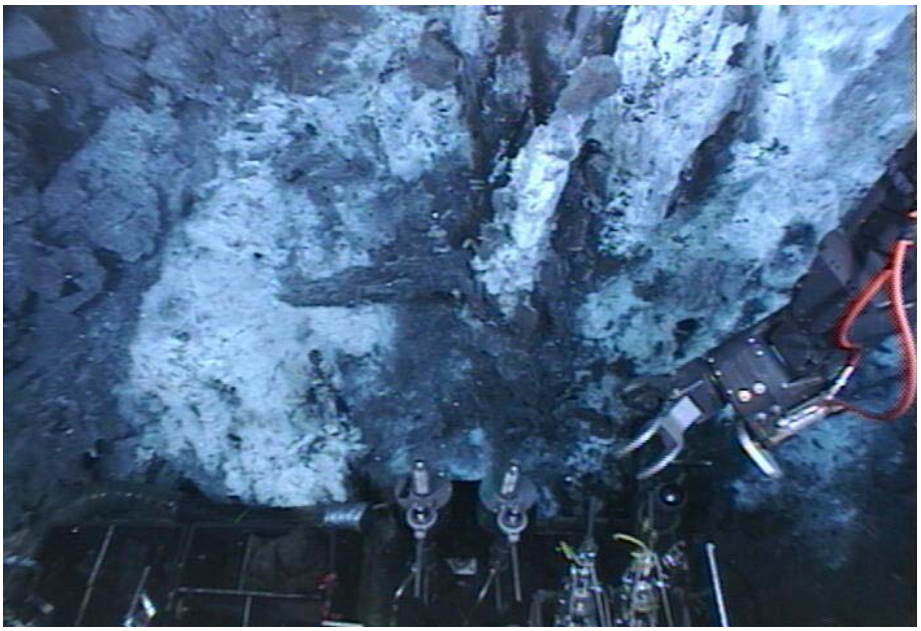
All active sulfide samples (table below) collected were sub-sampled for molecular and microbial culturing purposes. Water samples were only kept for culturing purposes. Once back at Portland State University, samples were enriched for methanogens (the water samples) and Aquificales (all samples). No positive methanogen enrichments from the water samples were made, however, all sulfide samples produced active cultures of Aquificales. Molecular analyses are ongoing and will be incorporated into a diversity study from the Eastern Lau Spreading Center.

Molecular and Microbial Culturing Sample List

Sample name (R, B)	Subsample Name	Description	Aliquot	Storage	Description	Notes	Temp after collection °C
J2-413-15-W	Niskin	niskin water	111	hungate	From Nathan Buck	30 m in plume.	
J2-413-7-m	J2-413-7-m	mat	222	hungate	From Rick Davis	blue slurp	
j2-413-8-m	j2-413-8-m	mat	333	hungate	From Rick Davis	green	
J2-416-9-R	J2-416-9-R-1	outer scrape (1-2mm)	1	cryovial		top fell off on collection so only hard botom retained. Sample was smelly, thick calcopyrite inner and outer white crust. Very hard. Some pyrrohtite	58
J2416-21-R	J2416-21-R-1	outer scrape (1-2mm)	8	cryovial		super sweet chimney, some white outer coat, top broke into a few pieces, large piece had some conduits, lined with hard chalcopyrite, some soft mushy mineral interior	132
J2416-10-R	J2416-10-R-1	outer scrape 10cm top	20	cryovial		tip fell off, rest hard iron oxide rich outer , inner calcophyrite lined conduits, some anhydrite. Broke in 3 main pieces, sampled all 8	160
J2417-B24	J2417-B24	Prometheus?	35	hungate	butterfield H2O sample		Tmax 13.4
J2417-B21	J2417-B21	22C white vent	36	hungate	butterfield H2O sample		Tmax 22
J2 -417-P8	J2 -417-P8		37	hungate	butterfield H2O sample		Tmax 50.3
J2-418	J2 -418-B24	red rock ridge	38	hungate	butterfield H2O sample		Tmax 13.8
J2-418	J2 -418-B22		39	hungate	butterfield H2O sample		Tmax 19.3
J2-418	J2 -418-P6		40	hungate	butterfield H2O sample		Tmax 26.7
J2-418	J2 -418-P1	Hades	41	hungate	butterfield H2O sample		Tmax 58.1

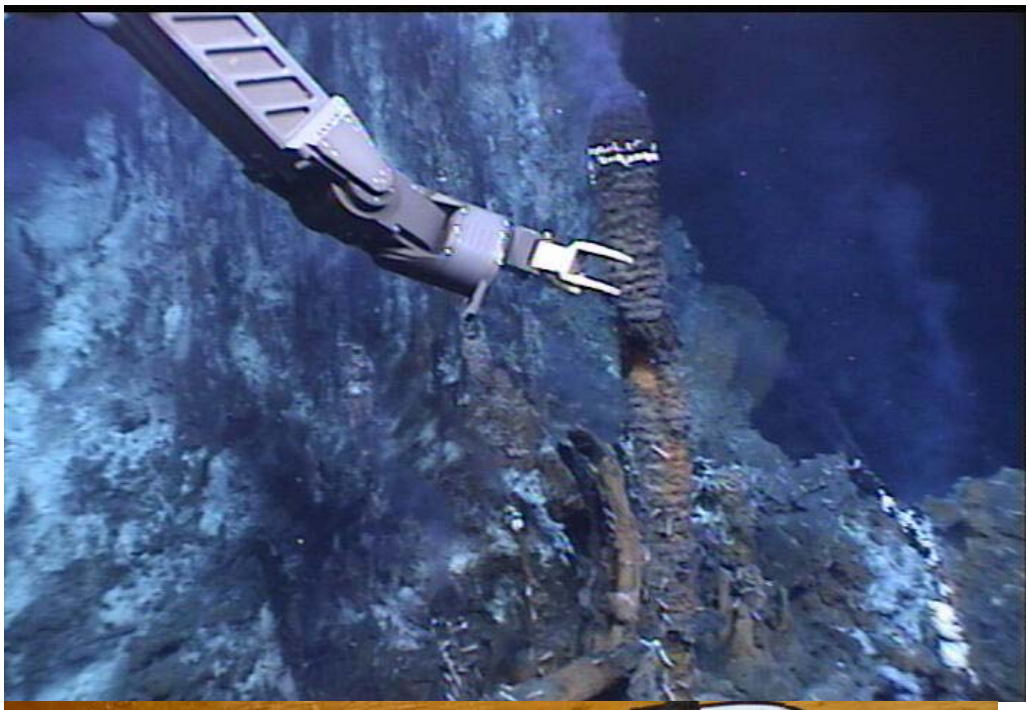
J2-416-9-R-1
15°2.334'S, 174°17.022W **Maka site**
Heading: 214°

Top of chimney fell off on collection so only hard bottom was retained. The sample smelled of sulfide and had a thick chalcopyrite inner (>2cm) and outer white crust. The sample was very hard and contained some pyrrohtite. The vent fluid temperature after sampling was: 58° C.



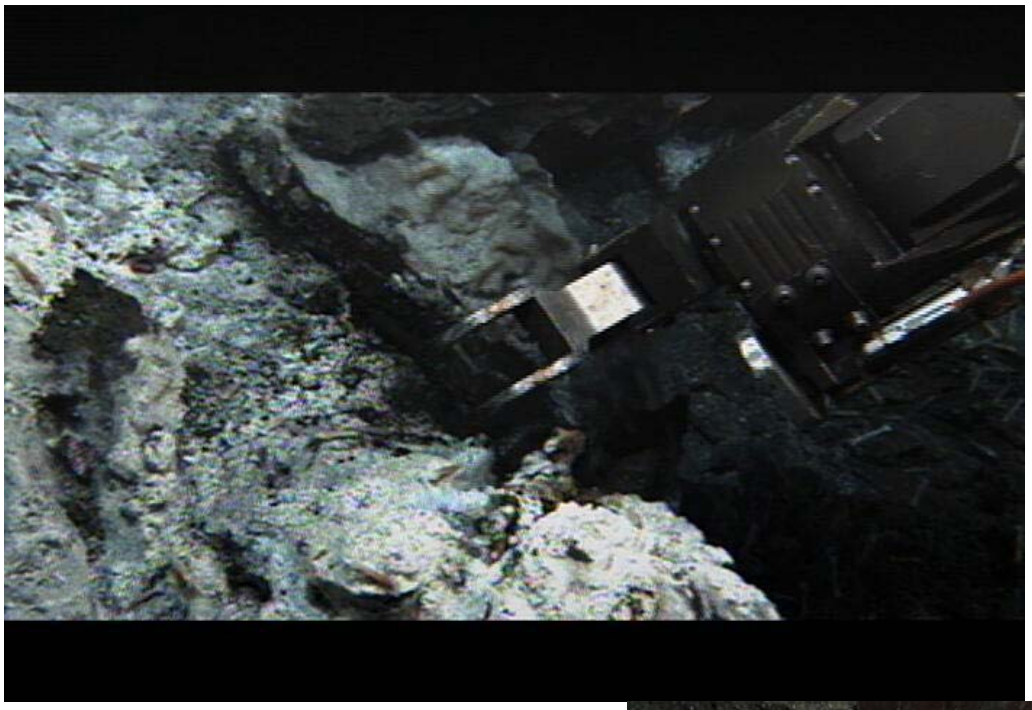
J2-416-10-R1
15°2.334'S, 174°17.022W Maka Site
Heading: 179°

The tip of the chimney fell off, The chimney was hard with iron-oxide rich outer, and chalcophyrite lined inner conduits with some anhydrite. The sample broke into 3 main pieces, which were all subsampled. The vent fluid temperature after sampling was: 160°C



J2416-21-R-1
15°2.334'S, 174°17.022W Maka site
Heading: 171°

This super-sweet chimney had some white outer crust/biofilm. The top most part broke into a few pieces with the largest piece containing conduits lined with hard chalcopyrite and some soft mushy chalcopyritic/pyritic mineral interior. The fluid temperature after sampling was: 132°C.



5.4 BIOGEOCHEMISTRY

James Cowen and Huei-Ting Lin

Measurements of total organic carbon (TOC) and of specific OC components (amino acids and in hydrothermal vent fluids and plumes provide key biogeochemical indicators of the state of the local subsurface biosphere, reflecting both recent-historic and contemporary processes. Dissolved organic carbon (DOC) should be depleted, relative to bottom seawater, in low temperature (<100^{o}C) diffuse effluents associated with newly erupted lava flows, but should increase in concentration as subseafloor communities develop with time and sustained hydrothermal flow. Basalt surfaces scavenge DOC, so in the absence of a DOC source within rocks, the DOC content of the effluent from either focused or diffuse (low temp, <100^{o}C) flow should be less than seawater and thus initial net DOC flux from such vents should be negative (i.e., new basalts should be a sink for seawater DOC). In established hydrothermal systems with a well developed subsurface microbial community, DOC, in particular labile OC compounds such as amino acids, are depleted in high temperature (>100^{o}C) effluents, but enriched in low temperature (<100^{o}C), diffuse vent effluents (Haberstroh and Karl, 1989; Svensson et al. 2004; Lang et al. 2006). Hence, the expectation is that the export of DOC, especially of labile organics such as amino acids, from new lava flows should be exceedingly low initially, but increase over time with increasing microbial activity. Similarly, older flows exposed to hot (>>100^{o}C) hydrothermal fluids should be depleted in labile organics due to thermodegradation. The well-constrained time stamp of these new eruptions at NELSC and W. Mata provide an unprecedented opportunity to observe the transition of a new lava flow from initial organic carbon sink to eventual OC source, in conjunction with parallel time series observations of changes in microbial community parameters, and geochemical fluxes.

Lang, S. Q., Butterfield, D.A., Lilley, M., Johnson, H.P. and Hedges, J. 2006. Dissolved organic carbon in ridge-axis and ridge-flank hydrothermal systems. Geochimica et Cosmochimica Acta 70, 3830-3842.

Haberstroh, P.R., Karl, D.M. 1989. Dissolved free amino-acids in hydrothermal vent habitats of the Guaymas Basin. Geochimica et Cosmochimica Acta 53 2937 – 2945.

Svensson, E., Skooga, A. and Amen, J. 2004. Concentration and distribution of dissolved amino acids in a shallow hydrothermal system, Vulcano Island (Italy). Organic Geochemistry 35, 1001-1014.

University of Hawaii CTD Sample Log (NE Lau Response Cruise TN234)

PI: James Cowen

Note: NH4; ammonium, Ntr: nutrients; OA: organic acids; Aac: Amino acid characterization; TAA: Total Amino Acids; DCN: Dissolved Carbon and Nitrogen; DOC: Dissolved Organic Carbon; POC: Particulate Organica Carbon

Reference Data File for CTD operations: See section 5.6.1 table: CTD Vertical Casts and Tows (NELRC – TN234)

CTD sampler type is #Niskin

Left column represents the UH sampler series number.

UH #	CTD Cast	Site	Nskn #	Sample Description	NH4	Ntr	OA	Aac	TAA	DCN	DOC	POC (ltr)	Comments
15	T09C01	NELSC	52	CTD Cast T09C01	Y	Y	Y	Y	Y	Y	Y	9.8	Particles on GFF filters for both #15 and #16 were grey green in color
16	T09C01	NELSC	18	CTD Cast T09C01	Y	Y	Y	Y	Y	Y	Y	11.7*	*Measured volume for UH #16 likely incorrect due to leakage from filter holder into container and overfill of container
2	V09C00	West Mata	23	Cast V09C00; Shallow test	Y	Y	Y	Y	Y	Y	Y	9.7	

UH #	CTD Cast	Site	Nskn #	Sample Description	NH4	Ntr	OA	Aac	TA A	DCN	DOC	POC (ltr)	Comments
3	V09C00	West Mata	23 (dup)	Cast V09C00; Shallow test	Y	N	Y	Y	Y	N	Y	N	
4	V09C01	West Mata	45	Cast V09C01	Y	Y	Y	Y	Y	Y	Y	10.3	
5	V09C01	West Mata	20	Cast V09C01	Y	Y	Y	Y	Y	Y	Y	9.4	Particles on GFF filters for #5 and #6 were yellow orange in color.
6	V09C01	West Mata	16	Cast V09C01	Y	Y	Y	Y	Y	Y	Y	9.1	
7	V09C01	West Mata	24	Cast V09C01	Y	Y	Y	Y	Y	Y	Y	9.6	
8	V09C01	West Mata	10	Cast V09C01	Y	Y	Y	Y	Y	Y	Y	9.8	
17	V09C02	Maka	34	Cast V09C02	Y	Y	Y	Y	Y	Y	Y	10.3	
18	V09C02	Maka	22	Cast V09C02	Y	Y	Y	Y	Y	Y	Y	10.3	
19	V09C02	Maka	33	Cast V09C02	Y	Y	Y	Y	Y	Y	Y	4.1	This sample collected ~2 hours after others of this cast (after Nate Buck did his XRF filtration); see UH 22 for duplicates taken
20	V09C02	Maka	43	Cast V09C02	Y	Y	Y	Y	Y	Y	Y	10.3	
21	V09C02	Maka	7	Cast V09C02	Y	Y	Y	Y	Y	Y	Y	*	*Filter was ripped (tossed), so NH4,Ntr,Aac,TAA,DCN,DOC are combo of filtered and unfiltered
22	V09C02	Maka	33	Cast V09C02	Y	Y	Y	Y	Y	Y	Y	**	**Duplicate of UH 19 (Niskin 33) for all UH parameters except POC

University of Hawaii *Jason-2* Sample Log (NE Lau Response Cruise TN234)

PI: James Cowen

Reference Data Files for Jason-2 operations: See dive sample lists. Section 3.5 for more sample information see dive sample lists in section 3.5. Also see Jason-2 fluid sample list at the end of section 5.5.1.

Left column represents the UH sampler series number.

UH #	Dive	Smplr Type	Site	Smpler #	Sample Description	NH4	Ntr	OA	Aac	TA A	DCN	DOC	POC (ltr)
11	414	FS (bag)	W. Mata	19	"Shrimp City" diffuse venting. See events ~1080-1113	Y	Y	Y	Y	Y	Y	Y	N
12	414	FS (bag)	W Mata	24	"Kohu" diffuse venting. See event ~890- 980; ~31.6°C; pH 2.6	Y	Y	Y	Y	Y	Y	Y	N
12 POC	414	In line GFF	W Mata	20	"Kohu" diffuse venting. Tmax:31.8; Tave:30.9	N	N	N	N	N	N	N	3.0
13	414	FS (piston)	W Mata	4	"Kohu" diffuse venting. Tmax: 31.6; Tave30.6;	Y	Y	Y	Y	Y	Y	Y	N
30	416	Ti-Major	NELSC Maka	11C (black)	Ti-Major; sulfide rich, hot. GFF filter was black after 110 mls; kept, air dried; no DI rinse	Y	Y	Y	Y	Y	Y	Y	--

UH #	Dive	Smplr Type	Site	Smpler #	Sample Description	NH4	Ntr	OA	Aac	TAA	DCN	DOC	POC (ltr)
31	416	Ti-Major	NELSC Maka	1C (green)	Ti-Major; sulfide rich, hot. GFF filter was black after 110 mls; kept, air dried; no DI rinse	Y	Y	Y	Y	Y	Y	Y	--
32	416	Ti-Major	NELSC Maka	10C (red)	Ti-Major; sulfide rich, hot	Y	Y	Y	Y	Y	Y	Y	--
23	417	FS (unfltrd Piston)	W. Mata										
34	417	FS (bag)	W. Mata	22	"Luo": vent in white sedimented/matted area	Y	Y	Y	Y	Y	Y	Y	--
35	417	FS (Unfiltd bag)	W. Mata	21	"Luo" depth 1278. Tmax: 22.4, Tave:21.5; 15 5.793 S; 174 45 W.								
36	417	FS (Unftrd piston)	W. Mata	8	"Hades": Tmax: 50.3; Tave:42.6; limited volume (60 mls)	N	Y	Y	Y	Y	N	Y	
37	417	FS (GFF)	W. Mata	20	"Luo"; GFF filter (5.0 liters filtered) Tmax:22.7; Tave:20.8	N	N	N	N	N	N	N	5.0
38	417	FS (Unfiltd bag)	W. Mata	21*	"Luo"; reps (Aac, TAA, DOC) for bag #21 (UH 35)	N	N	N	Y	Y	N	Y	
41	418	FS (Unfilt bag)	W. Mata	21	J2-418; first fluid collection site "Creamsicle"; depth 1198.	Y	Y	Y	Y	Y	Y	Y	--
42	418	FS (Filtrd bag)	W. Mata	19	"Creamsicle" depth 1196 m	Y	Y	Y	Y	Y	Y	Y	--
43	418	FS (Unfiltrd bag)	W. Mata	24	"Red Rock Ridge" section; heading 95; depth 1181m. Tmax:13.8; Tave:13.2	Y	Y	Y	Y	Y	Y	Y	--
44	418	FS (GFF)	W. Mata	20	"Red Rock Ridge" Tmax: 16; Tave:13.8; filter slowed (tot: 2.155 liters)	N	N	N	N	N	N	N	2.2
45	418	FS (Unfilt bag)	W. Mata	22	J2-418; Upper part of "Shrimp City" at 1176 m, hdg 121; wand in crack; Tmax 19.3; Tave: 18.9	N	N	Y	Y	Y	N	Y	--
46	418	FS (Unfltd Piston)	W. Mata	6	"Akel Afi"; 1199 m, 218 heading; sulfur smoke	Y	Y	Y	Y	Y	Y	Y	--
25	420	Ti-Major	W. Mata	Black	"Just downslope from Hades Area" In smoke/steam above cooling 0-age lava; collected at end of dive.	Y	Y	Y	Y	Y	Y	Y	**
1	---	---	Blank 1	---	Ships DI blank, dispensed w/syringe through filter (all blanks are like this except Blank 8)	Y	N	Y	Y	Y	N	Y	N
9	---	---	Blank 2	---	Ships DI blank, Number out of sequence; collected w/Jason 414 samples	Y	N	Y	Y	Y	N	Y	N
10	---	---	Blank 3	---	Ship's DI blank, Number out of sequence; collected w/V09C01 samples	Y	N	Y	Y	Y	N	Y	N
14	---	---	Blank 4	---	Ships DI blank, Number out of sequence; collected w/T09C02	Y	N	Y	Y	Y	N	Y	N
24	---	---	Blank 8	---	Ships DI blank, Ships DI right out of Barnstead 'Diamond' system (no syringe or filter)	Y	Y	Y	Y	Y	Y	Y	--

UH #	Dive	Smplr Type	Site	Smpler #	Sample Description	NH4	Ntr	OA	Aac	TA A	DCN	DOC	POC (ltr)
29	---	---	Blank 5	---	Ships DI blank/	Y	Y	Y	Y	Y	Y	Y	--
33	---	---	Blank 6	---	Ships DI blank/	Y	Y	Y	Y	Y	Y	Y	--
40	---	---	Blank 7	---	Ships DI blank/	Y	Y	Y	Y	Y	Y	Y	--

5.5 CHEMISTRY

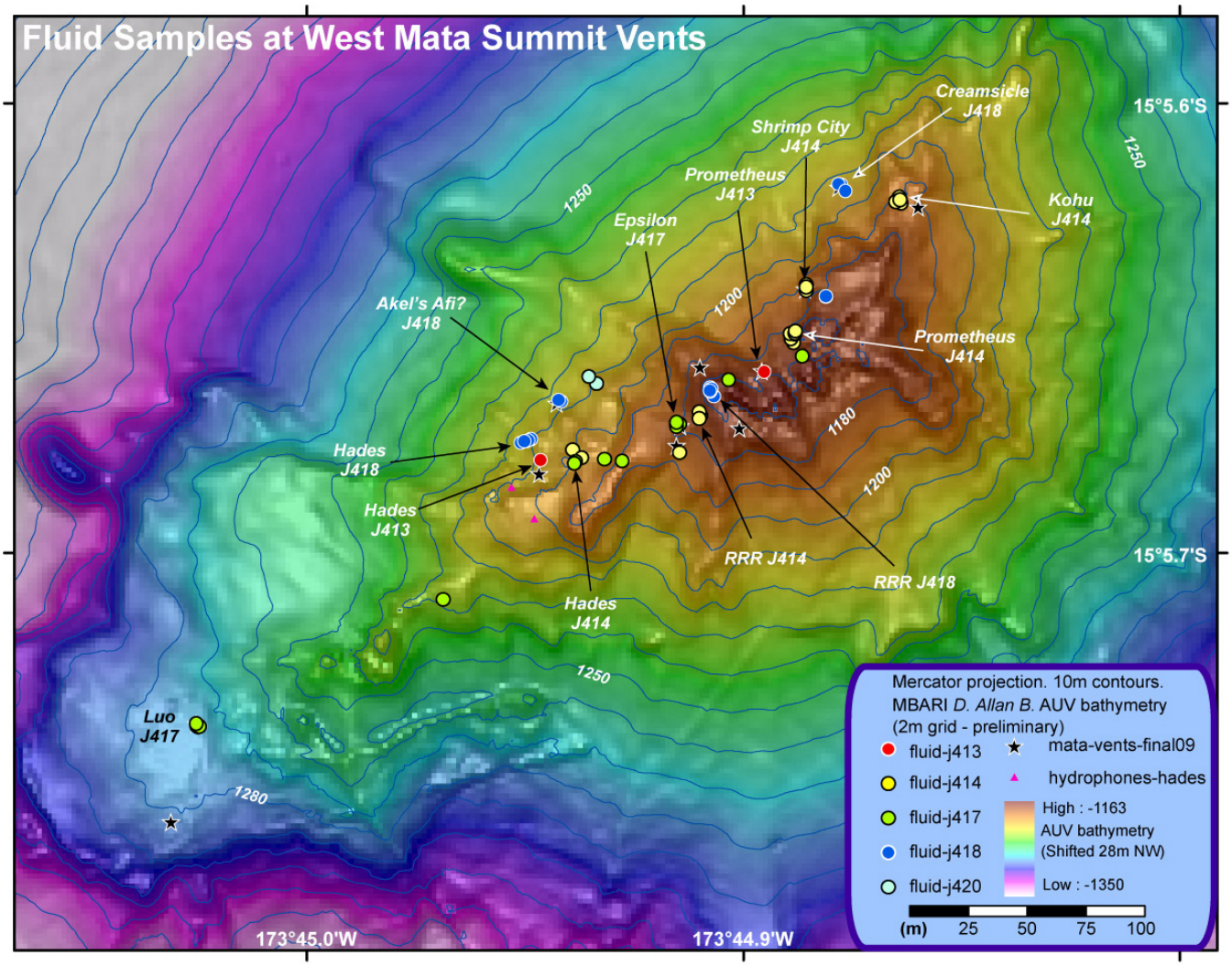


Figure 20. Fluid samples at West Mata summit vents.

5.5.1 Summary of Hydrothermal Fluid Sampling

David Butterfield

The purpose of this section is to describe the sampling and shipboard methods, sample distributions, and the sampling sites used during the NE Lau response cruise. Because the sites are dynamic and are not typical black smoker or diffuse vents, a collection of images to show the sampled sites is included (after this summary).

Sampling Methods

During the NE Lau response cruise, titanium major samplers, gas-tight samplers, and the PMEL Hydrothermal Fluid and Particle Sampler (henceforth HFS) were used to collect hydrothermal and volcanic fluids. The HFS was configured to collect 18 discrete water samplers, of which 9 were piston samples (HFS numbers 1-9) and 9 were collapsible Teflar inert plastic bags within cylinders (HFS numbers 16-24). The system was set up to have roughly an equal number of filtered and unfiltered water samples. All filters used on HFS were Millipore 0.4 micron pore size polycarbonate membranes, type http. In addition to the water sample containers, the system had 6 positions for sterivex cartridge filters for DNA/RNA sampling (HFS numbers 10-15). For some of the dives,

cylinder 20 was removed and replaced with a 47mm filter holder for glass fiber filter sampling of particulate organic material. In addition to the sample ports, the home port was connected to a housing for an in-situ pH sensor (AMT, Rostock, Germany), and this sensor was used on most of the dives to collect data on the pH of venting fluids. The sensor worked well throughout the cruise based on repeat calibrations in the lab. A hydrogen sulfide sensor (calibrated by AMT immediately before the cruise) was also installed, but the response needs to be carefully analyzed to determine if there are valid results.

Newly manufactured titanium pistons with Teflon end caps replaced several of the PVC pistons to improve our capability to capture whole samples of gas and aqueous fluids. We also used discrete titanium gas-tight samplers held by the manipulator, and "port" and "starboard" gas-tights connected to the HFS fluid line near the junction of the nozzle hose with the fixed titanium manifold on the sampler frame. This allowed gas-tight samplers to take advantage of the extended reach of the HFS nozzle.

A large volume cartridge filter at the inlet of the flush pump removed sharp volcaniclastic material and sulfur to prevent damage to the pump head. Problems with the sampler were limited to plumbing issues: twisting and kinking of the intake hose, partial clogging of the nozzle tip, and at least one case of damaged tubing on the side of the sample manifold that connects to the back of the sample containers, resulting in low sample volume for the particular lines affected. The issue of leaky plumbing was not diagnosed until the end of the cruise during cleanup. In spite of the problems, very good set of samples were collected during this expedition. The long nozzle was useful for sampling fluids at sites of active eruption.

Shipboard Analysis

Samples were analyzed on board for H_2S (modified Cline spectrophotometric method) silica (silicomolybdate method of Froehlich), ammonia (indophenol), pH with Ross Sure-Flow semi-micro electrodes at lab temperature, and alkalinity by automated titration. Sample cuts were preserved for frozen nutrients, majors (filtered), trace metals, O/H isotopes, S isotopes, 13C-DIC, and sulfite measurement preserved with formaldehyde. Marv Lilley and Tamara Baumgardner analyzed methane and hydrogen by GC on nearly all HFS fluid samples. Jim Cowen took aliquots for dissolved and particulate organic analysis.

Personnel Involved in Fluid Sampling/Chemistry

Dave Butterfield - HFS setup, sampling, sample processing, pH, alkalinity
Kevin Roe – HFS setup, major sampler setup, sample processing, H2S, dissolved silica and ammonia analysis
Julie Huber – Sterivex filter processing, sampling, on board microbial culture work
Marv Lilley – methane and hydrogen analysis by gas chromatography
Leigh Evans – gas-tight sampler setup and extraction
Jim Cowen – organic chemistry sample preservation
Tamara Baumgardner– gas chromatography

Sampling Summary

The sampling strategy was to collect as broad a range of fluids as possible, using either major samplers or HFS, to assess the range of composition and temperature of fluids during active eruption processes. A second goal was to look for correlations between vent location, temperature, fluid composition, and animal and microbial communities. HFS was used on Jason-2 dives 414, 417, and 418, all at West Mata. Major samplers were used on dives 413 (W. Mata), 415 (NE Lau S.C.), 416 (Maka volcano), and 420 (West Mata). See divemaps for sample locations (Figs. 6 through 12) and Figure 20 for fluid samples at West Mata only.

During the very first dive (**413**, 5/6/2009), one major-sampler sample was collected at the Prometheus volcanic vent (1175m depth) at 20:21 UTC. Visibility was near-zero and the sampler was obscured during sampling. It was not possible to take a temperature measurement. This major sample has lots of volcaniclastic pieces in the

intake nozzle and was leaking badly during processing. The pH of the sample was near neutral, so it must have entrained a lot of ambient seawater. A gas-tight was taken a few minutes later in the same location.

During the second dive at West Mata (**414)**, HFS with the long sample intake nozzle was deployed. This nozzle adds approximately 40 cm of un-insulated titanium tubing onto the end of the nozzle, so the temperature sensor is not as close to the warm fluid as it normally is, and the temperature readings can therefore reflect some conductive cooling within the nozzle. The absolute amount of cooling is proportional to the temperature of the vent and the rate of flow through the nozzle. Throughout the dive, there were issues with the sample exhaust indicating little or no flow. In some cases, the diagnosis was not clear, but in general this problem was probably caused by partial clogging of the inlet by volcaniclastic debris, resulting in unusually high suction within the manifold. The main flush pump generates more suction than the sample pump, so samples may not have filled due to this clogging problem. The strainer that goes on the end of the long nozzle has smaller openings than the normal nozzle, and this probably contributes to the unanticipated problem. This was compensated for it in later dives by 1) trying to avoid clogging the tip, 2) periodically turning off the flush pump (or flushing in reverse in extreme cases) to allow clogging debris to fall off the tip, and 3) running the flush pump at a lower speed to reduce the level of suction in the manifold. Better success was encountered on the second and third HFS dives.

The first sampling site during 414 was **Kohu** vent on the NE part of the summit (pillow lava) ridge, x,y 1075,890, heading 62°C, depth 1188m, from approx 09:15 to 10:00. Kohu had cloudy water venting from lower areas of white/light staining, surrounded by orange-coated rock in the distal areas away from direct flow which was interpreted as iron oxides precipitating out of reacted acidic solutions. The white material may be either bacterial mat or sulphur or both combined. No animals were visible in the area where the sample was collected. However, looking to the starboard towards the end of the sampling interval (at 9:44 in the video) a few shrimp were observed swimming near some other venting. We made the first in-situ pH measurement of the dive series here, finding a pH of 2.64 with the AMT sensor on the HFS. Fluid temperature was up to 31.8°C. There was a visible particulate plume coming up from behind the vehicle and downslope as we were sampling at Kohu vent. The first sample, piston 1, had very low recovered volume and appeared to be mostly seawater when analyzed. The remaining samples at this site were good: unfiltered bag 24, unfiltered piston 4, glass fiber filter 20 (3 liters), and sterivex filter 15 (3 liters). We fired the port gas-tight sample connected to HFS at 09:59 while finishing the Sterivex sample.

From Kohu, the ROV moved a few 10s of meters southwest and a few meters shallower to **Shrimp City**, a vent similar to Kohu in appearance, but with a relatively dense population of shrimp, many of them apparently carrying eggs. The HFS was collected samples with the nozzle inside a crevice with white staining. The depth was 1181m, heading 138, x/y 1037/855. Temperatures here were just below 15°C. In-situ pH was considerably higher at 5.63. We took unfiltered bag 23, filtered bag 19, and sterivex filter 14. All were good samples.

The ROV moved next to **Prometheus** vent near the summit peak (depth 1173m, x/y 1030/834, heading 139), which was very active, producing sulfur-rich clouds, volcaniclastics, red glowing rock, and red/yellow flames. At Prometheus, the last two HFS piston samples (unfiltered Ti piston 6 and filtered piston 7 taken at 13:30 and 13:55) were successful. The temperatures were 40.2 and 41.6°C maximum for the two samples. The starboard gas-tight sample on HFS was collected just before the two pistons. None of the other samples had enough volume of water to process.

There was one final HFS sampling station on dive 414 at Red Rock Ridge (depth 1181m, x/y 993/802, heading 42°), but none of the samples taken here were successful. The temperature went up to 18.4C and an in-situ pH measurement was 2.7. It is not clear if this was affected by the plumbing problem. Sterivex filter number 10 is probably not good, as the water samples before and after it had extremely low volume. Overall, fewer high quality samples were collected than expected on this dive due to the clogging problems, but samples were collected from Kohu, Shrimp City, and Prometheus, thus providing some valuable information.

During dive **415** (fig. 8), one major sample was collected at the Nautilus diffuse site on the NE Lau spreading

center with maximum measured temperature of 20.5degC. There were large shrimp, curly “spaghetti-like” tubeworms, vent fish, crabs and mussels at this site. The vent site was a steep, jumbled rocky substrate with cloudy water, located at 15°22.989’S, 174° 14.681’W, depth 1616m, heading 180. A background seawater sample was collected at 1635m depth, 2.5degC ambient temperature. Marker 148 was left here.

For dive **416** (fig. 9), we 4 majors and 4 gas-tights were deployed on Jason. All 4 majors were collected at **Maka volcan**o within a vent field with sulfide chimneys. The location of the sampled chimney was 15°25.332’S, 174°17.026’W, depth 1525, heading 140. The vent orifice was very small and difficult to sample at this site. Maximum temperature measured was 315°C. Three of the majors had nearly identical pH (average 2.98). One was noticeably gassy and the samples may have slightly lower than seawater salinity (28 per mil versus 33 per mil background).

Dive **417**, 5/10/2009. For this dive, the HFS was deployed again. The dive did not start well for Jason as the starboard manipulator had a ground fault and could not be used. This resulted in the use of the more difficult port arm for all operations, and hand-held gas-tights could not be triggered for lack of a hydraulic ram. The first sampling site was **Mat Meadows**, in the SW portion of the summit at 1278m depth, x/y 778/633. There were intense white and orange mats here, but no visible flow to sample with HFS. Shrimp were not noticeable here.. After sampling mat/sediment, the ROV moved about 40m North (x/y 787/674) to **Luo**, a rocky outcrop that is possibly part of a volcanic-pit vent, with visible flow over steep white-stained surfaces. Shrimp were present above the sampling spot, and were stirred up. At this site 4 HFS samples were collected (unfiltered bag 21, sterivex 15, filtered piston 5, and GFF 20). Temperature was up to 22.7°C with in-situ pH of 5.1. HFS functioned normally, and samples throughout the dive had normal volume with the exception of bag 23 (not enough to process). Dive 417 continued moving toward the summit and the volcanic vents, stopping to collect a rock and then **looking for Red Rock Ridge** to collect the fluid samples that failed on Dive 414. What was found instead, was called **“Epsilon”** vent site (x/y/z 982/800/1187, heading 141) that was slightly deeper but within 10-15 meters of Red Rock Ridge (x/y/z 993/802/1182, heading 41). The **Epsilon** site had long filamentous light-colored mats waving in the currents. The first sample here was unfiltered bag 22, maximum T 29.6°C, average 28.9. In-situ pH at end of sampling was 2.6. The following samples were also collected here: bag 23 (failed), filtered bag 19, and sterivex 14. The search for Red Rock Ridge continued after these samples were taken but visual evidence for the location where the mat sample had been taken previously was not encountered and the ROV proceeded on to Prometheus. During the search for Red Rock Ridge, D.B. used the sample pump only to pull ambient water through the pH sensor block, finding a drop in 1.0 pH unit relative to ambient water, corresponding to (lagging) a 1.6°C temperature anomaly. A background **near-bottom plume sample** was collected in bag 16. We arrived at **Prometheus** vent at 12:05 and started to sample at 12:12. Activity was intense and steady with near-continuous tephra generation, thick clouds of sulfur-rich particles, and flashes of red glow. Initially, fluid temperatures reached 30-48°C, but a combination of poor visibility, variation in the position of the outflow, and likely clogging of the tip with volcaniclastic material, resulted in lower temperatures. Unfiltered bag 16 was collected at Prometheus, but there was very little temperature anomaly, and this sample appeared to be seawater dominated. Around 12:45, the inlet temperature was higher again, but the T2 manifold temperature remained low, indicating poor flushing. A small volume piston 2 was collected at this point, which had good hydrothermal content. Although warm water was still not penetrating the manifold (probable clogging at inlet), Piston 3 was collected and 80ml of acidic fluid in the lab. The next sample, piston 4, had good flushing of the manifold. When the manifold filled up with warm fluid, the flush pump was turned off. Piston 4 sample was full and very acidic. The last sample taken at Prometheus for this dive was unfiltered bag 24, starting at 13:07. The vent was in a very active stage, producing lots of tephra and clouds of particles that reduced visibility to zero at times. The temperature for bag 24 was lower, but the sample was full and acidic. During this last sample, there was a large burst of tephra that covered the front of the ROV with approximately 60-80 pounds of rock. This put an end to the sampling at Prometheus and took 20-30 minutes to clean off.

Between leaving Prometheus and arriving at the next sampling site, the manifold was flushed and a **background seawater** sample collected (filtered piston 9) at 14:58, 9m altitude, 1214m depth. This sample came out with normal background seawater pH, indicating normal sampler operation.

Hades volcanic vent was the next stop, and it was vigorously erupting when we arrived. Unfiltered piston 6 was collected in a sulfur-rich plume. The depth of the ROV was 1203m and the heading was 078, x/y 942/782. While taking this sample the activity briefly stopped and restarted, but the source we were sampling changed or moved. Good flow through the manifold was achieved ad indicated by warm temperatures at T2. The absence of clogging was likely associated with keeping the nozzle away from molten sulfur and rock. The sampler worked normally with good flushing for pistons 6 and 8 at this first setup at Hades. The intake nozzle could not be seen for most of the sampling due to the large particulate clouds. Hades seemed to be going through a cycle about every 2 minutes, alternating between large white plumes that would envelop the ROV and more focused yellow plumes coming directly out of the vent in front of the vehicle. During the collection of filtered piston 7 the sample pump kept shutting off after 15 sec of pumping, probably due to clogging of the filter on the sample with fine sulfur. According to the pump 215 ml of sample was collected, however this sample only yielded 35ml of water on deck. The port gas-tight on the HFS manifold was collected at 16:41 with an inlet temperature of 32. The starboard gas-tight was collected at 16:46. There was a lot of red glow/flame in the source at this time. Unfiltered piston 1 was taken starting 16:47 in the plume over the red glow. In-situ pH of Hades plume just after taking piston 1 was approximately 1.62, with a somewhat slow response on the pH sensor, possibly due to the protective filter on the sensors becoming caked. Piston 1 was a full-volume sample and the last one of the dive. Two Niskins were taken in the plume above Hades at 1179 m depth.

Jason **dive 418** (5/11/09) also had the HFS on board in the same configuration as the other two dives. This dive started deep (~1500 m) and did not find any active venting on the geological transect up toward the summit. The lavas down the slope were generally older, cooler, and had some sessile fauna attached, as well as normal benthic mobile fauna. At 09:05 near the 1200m depth (x/y 1062/922) on the north side of the ridge crest 20m NW of Kohu, many polychaete worms were observed in the water column, followed by orange staining on rocks. The first sign of shimmering water and white staining came around 09:15 on the summit ridge crest near 1194m depth. Observers noted red, orange, white and olive colored staining/mat at this vent site, named **Creamsicle** (based on the depth of 1194, this is closer to Kohu than x/y indicates)**.** Started sampling at 09:28. Julie Huber reported pH of 7.7 for this site, but the sample pump was not turned on, so this reflects ambient seawater pumped through the sensor block during descent. Unfiltered bag 21, filtered bag 19 and sterivex 15 were taken here with very stable T1 (29.2°C) and T2 (15.5°C). Finished sampling at 09:54.

After finishing sampling at Creamsicle, the ROV headed generally S to SW towards Hades, sampling rocks along the way. The ROV arrived **at Hades** at 11:45, depth 1198m and deployed the hydrophone and marker 49. The first observations at Hades looking NE at the vent showed eruptive activity with tephra in the background and white and yellow smoke coming out of a berm of tephra in the foreground. The ROV turned to look south where more white and yellow smoke and gas bubbles were observed along a roughly N-S bulge or spine. The local water current was transporting the smoke away from the ROV roughly to the SSE. The ROV approached to sample from heading 083 at 12:30 and immediately measured 55 - 60°C temperatures in the smoke coming out of volcaniclastic mound. Unfiltered piston 1 was collected at this time, and the port gas-tight on HFS was fored simultaneously. The gas-tight pressure pulse probably caused the flush pump to stop halfway through piston 1, but the manifold was full of vent fluid, so this did not affect the sample quality. This gas-tight should correspond well with piston 1. Filtered titanium piston 2 was collected immediately after piston 1, and had slightly higher temperature. Clogging of the sample filter caused the sample pump to stop twice. Pistons 1 and 2 were excellent samples. The sampler was working normally and clogging was not a problem. Piston 4 was taken in the same spot with little change in conditions. The last HFS sample here was filtered bag 18. An in-situ pH of 1.2 was measured on venting fluids up to 80°C (T2 only up to 14°C). The green discrete gas-tight was taken at 13:20 in the same spot as the other samples at Hades. The manifold and sensor block were flushed for 15 minutes with seawater, while taking temperature measurements in the sediment. The sampling conditions at Hades were remarkably stable for 30 minutes. There was a large explosion with tephra fallout from the vent beyond where we were sampling at 13:03.

After finishing at Hades, we conducted some exploration and found another volcanic vent, named "**Akel's Afi**".

This vent was recycling rocks like a washing machine, with rocks being tossed up, falling back down and rolling around before being tossed up again. The ROV set up to sample the vent on the left to start, because it was not producing as much tephra that might clog up the intake. Sampling was started with filtered piston #5. The temperature went up to 35°C before starting, but was only 25°C during the sample collection. The pump stalled 3 times due to filter clogging. Piston 5 yielded a small volume on deck. Piston 6 was collected under very similar conditions. The HFS continued to work normally throughout the dive. The starboard gas-tight on HFS was fired at 14:50:40 with a temperature of 19°C. D.B. was about to put the intake nozzle into the flaming vent when the ship moved and pulled Jason out of the vent. We were unable to get back to this site, so sampling and observation here were cut short.

After the ship settled, the ROV again searched for **Red Rock Ridge.** Although the ridge was located the exact spot where mat samples had been taken previously was not identified. It was very similar in appearance and within 10 meters of the previous site, so sampling was undertaken. A total of 5 samples were collected from a small vent in white-stained rock, with red staining in the distal areas. The samples were unfiltered bag 24, filtered bag 16, sterivex 14, GFF 20, and unfiltered bag 23 (later contaminated by error). The nozzle was moved around slightly to optimize sample collection. The flow was very weak here and the temperature varied during sampling. Sampling at Red Rock Ridge was completed by 17:08.

With time running out, we opted to find a site nearby with shrimp and take bio and fluid samples. The ROV stopped at nearby Epsilon vent and put out marker 147. No shrimp were seen at Epsilon. The ROV continued past Prometheus to a site **near Shrimp City** with hundreds of shrimp (x/y/z 1043/851/1175, heading 125 time 17:34). After sampling shrimp by suction, we took unfiltered bag 22 and filtered bag 17. More fluid was mistakenly added to unfiltered bag 23 that had previously been used at Red Rock Ridge, making the sample invalid. The maximum temperature at the shrimp site was 20 - 21°C with the Jason temperature probe and 18 - 19.4°C by HFS during sampling, indicating some minor entrainment and/or cooling during sampling. [There is an erroneous report of a pH measurement of 6.6 at the Shrimp vent. No measurement was taken there. The pH sensor had a clogged filter by the end of the dive and was not flushing.] Dive 418 ended immediately after the last HFS sample was taken.

Dive 419 was aborted just after launching. **Dive 420** was configured with 2 major samplers and 3 gas-tights. During this last dive, extended observations of active pillow lava formation were **made near Hades and Afi** volcanic vents. Having sampled the other types of venting reasonably well, and not having the long reach of HFS, samples of warm fluids produced within the actively forming pillow mounds within less then 15 minutes of their formation were collected instead. Slightly smoky gray fluids were coming up around very recently formed pillows. The two majors and one gas-tight were the last fluid samples collected during the expedition. After finishing the sampling, it was thought that we were closer to Hades vent rather than Afi vent. The renavigated position at the sample site (within a few meters of the active volcanic vent) was x/y/z 947/813/1196 at heading 160. The renavigated position of the hydrophone and marker next to Hades was 931/789/1197 at heading 189, or approximately 28 meters to the SSW.

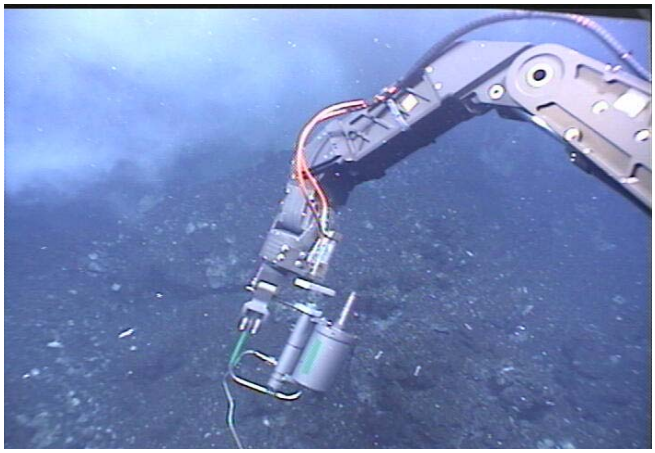
Preliminary Observations

The active venting that we found on West Mata was above the 1280m depth horizon, within 110meters of the summit peak, and all was along the summit ridge trending roughly 045°. Alteration features were seen deeper, but active venting was not. This geologic context is similar to that of NW Rota-1 although with the deeper water and higher pressure, West Mata has less free gas bubbles venting than NW Rota-1. Fluids venting from Prometheus, Hades, and Akel's Afi volcanic vents are all strongly acidic, with sample pH ranging from 1.5 to 2. This can only be attributed to high sulfur dioxide content in the fluids, for which we have preliminary confirmation in the lab. Diffuse vents have a range of pH from 2.6 to 5.9, representing a range of reaction progress between acidic magmatic gases and volcanic rock. Kohu, Epsilon, and Red Rock Ridge have low pH (2.6-3.0) and no shrimp present, while Shrimp City and Luo have pH 5.3 to 5.9 with abundant shrimp. Although based on a limited number of observations, this supports the hypothesis that shrimp are avoiding either the high

sulfite or high acidity of the low-pH vents. While shipboard data allow preliminary characterization of the fluids collected, full observations await sample analysis in the laboratory

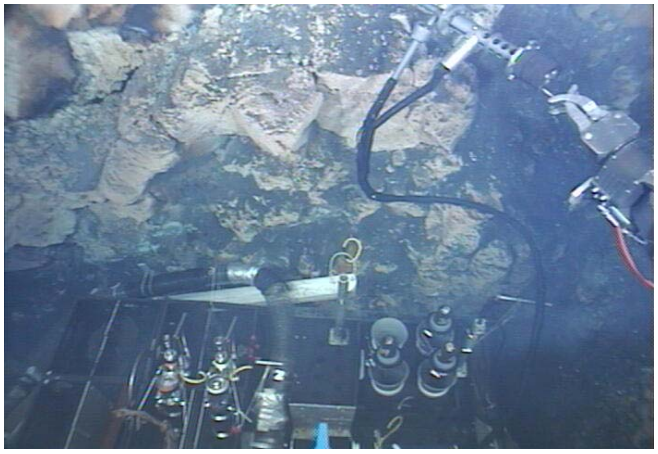
Fluid Sample Images from NE Lau Response Cruise

Dives J2-413 and J2-414 at West Mata



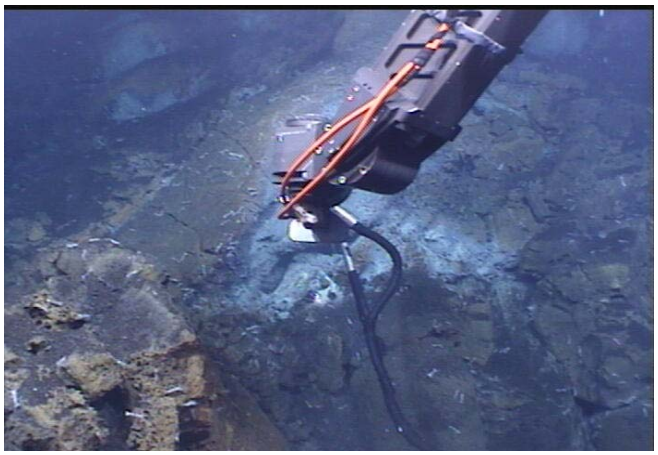
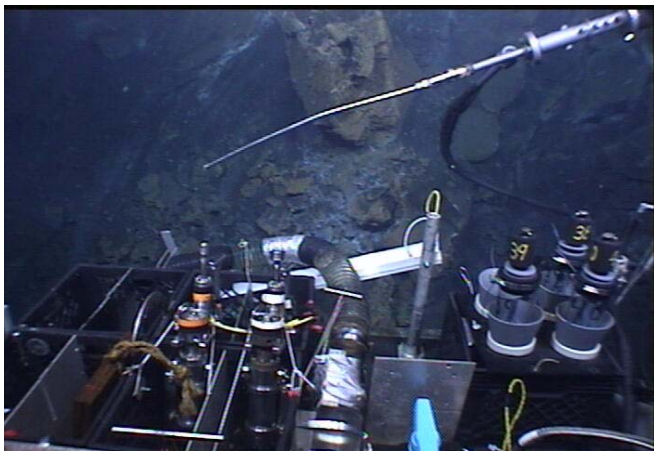

(left) Dive 413 Major at Prometheus 1175m depth before sampling. **(right) Dive 413** Major (sample 10) at Prometheus just after triggering. 2009/05/06 20:21:57. Sampler obscured by smoke during triggering. Large amount of seawater in this sample. Only other samples this dive were two Niskins in the plume at the end of the dive. NO TEMPERATURE MEASUREMENT.


(left) Dive 413 gas-tight (sample 11) at Prometheus 5/6/2009 20:26:50. **(right) Dive 414** Wide view of the Kohu sampling site.

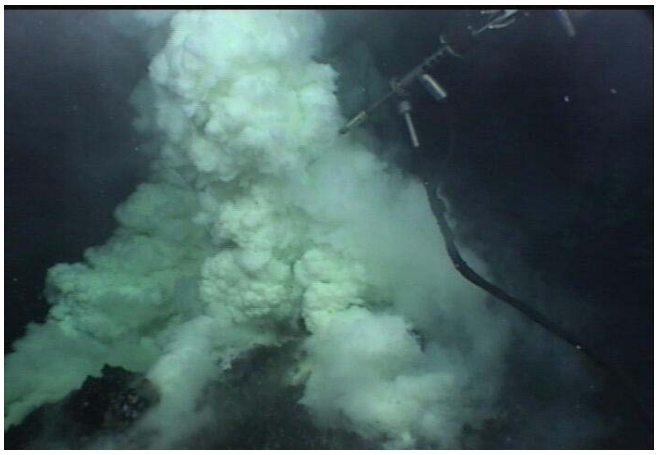



(left) Dive 414, 2009/05/07 09:52:01 camera 3, Kohu vent. Looks like volcaniclastic material on top of the rocks. **(right) Dive 414** 2009/05/07 10:58:02. Shrimp City initial setup. Staining is similar to Kohu, but with a very dense shrimp population.

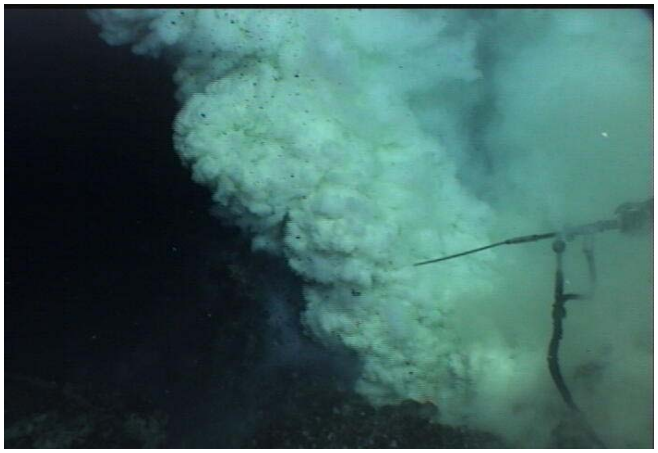
Dive J2-414 (cont.) at West Mata

(left) Dive 414 2009/05/07 11:03:42 Shrimp City beginning to sample. Sampled 14.9degC water here with in-situ pH of 5.63. Filtered bag 19, unfiltered bag 23, sterivex 14. **(right) Dive-414** End of sampling at Shrimp City.

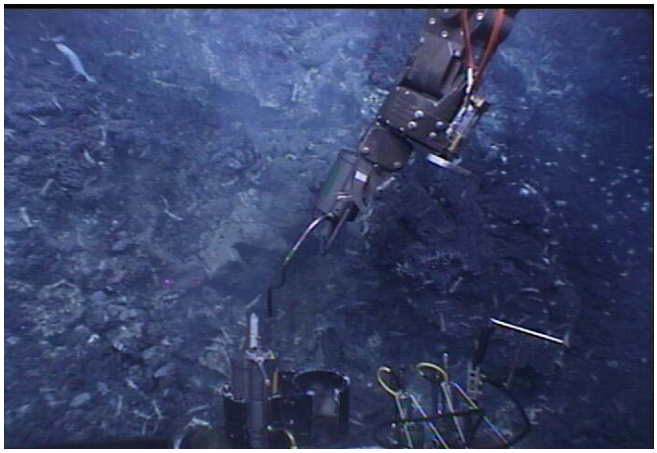



(left) Dive 414 2009/05/07 13:10:03 HFS setup at Prometheus vent. Many of the samples taken here failed due to probable clogging. **(right) Dive 414**, 2009/05/07 13:29:41 Sampling unfiltered piston 6 in plume over Prometheus. Also fired starboard HFS gas-tight at this time.

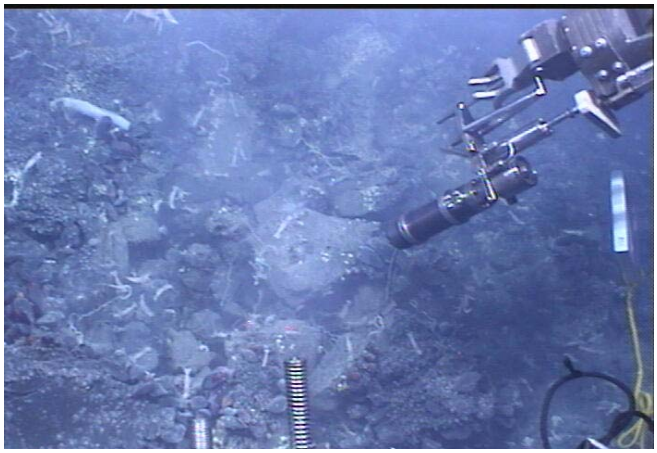



(left) Dive 414 2009/05/07 13:53:04. Taking filtered piston #7 at Prometheus. **(right) Dive 414**2009/05/07 15:54:24. Fluid sampling at Red Rock Ridge. The samples failed, but temperature was up to 18.4°C, in-situ pH 2.7. No shrimp visible at this site.

Dive J2-415 at NELSC



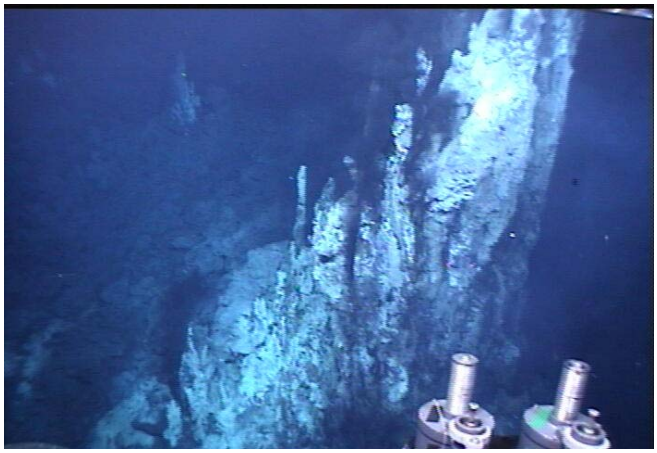
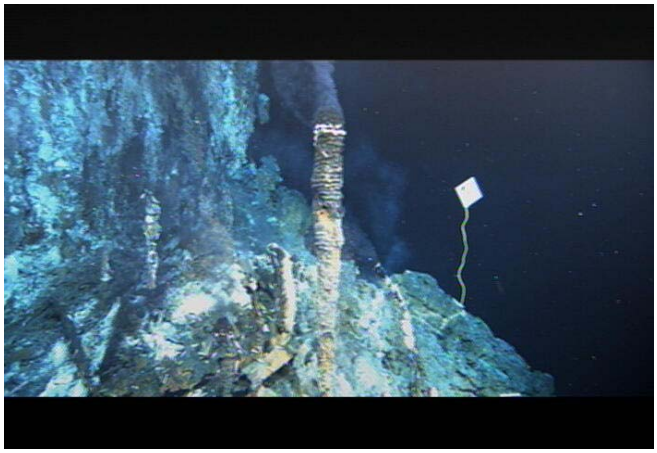

(left) Dive 415 2009/05/08 14:53:06 NELSC diffuse site with shrimp, curly worms, fish and other biota. Took one major sampler here. Location is 15°22.989'S, 174° 14.681'W, depth 1616m, heading 180. **(right) Dive 415** 14:44 NELSC diffuse site showing the size of shrimp relative to major sampler.



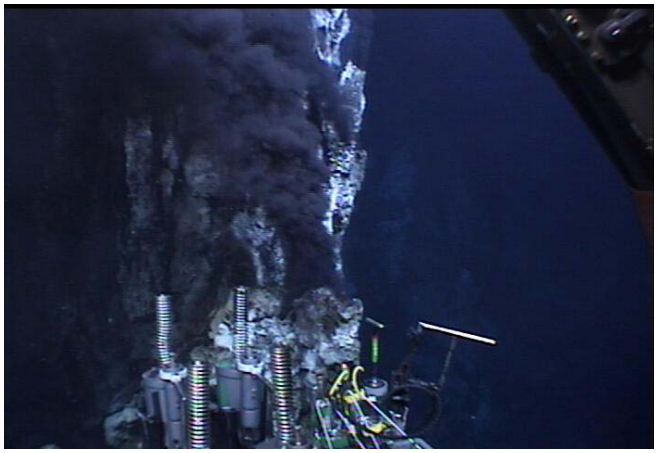

(left) Dive 415 2009/05/08 15:24:25 Marker 148 diffuse site on NELSC, taking gastight (no color) in same spot as major sample. **(right) Dive 415** 2009/05/08 15:29:21 Closeup of sampled vent site showing curly tubeworms, shrimp, and mussels around the periphery. Note 10cm laser dots for scale of shrimp.

Dive 415 2009/05/08 16:02:16 Sampling a rock on new lobate lava flow with extensive white staining at 15° 22.985' S 174° 14.600'W depth 1636m.

Dive J2-416 at Maka

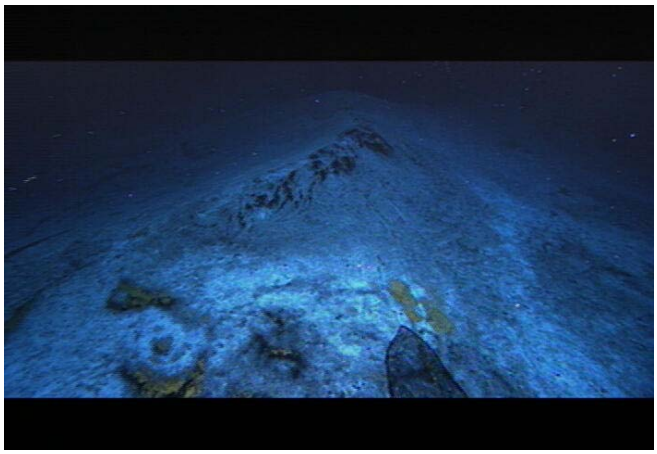



(left) Dive 416 2009/05/09 12:03:05 View of upper part of Maka sulfide chimney. **(right) Dive 416** 13:50 View of chimney at Maka volcano.

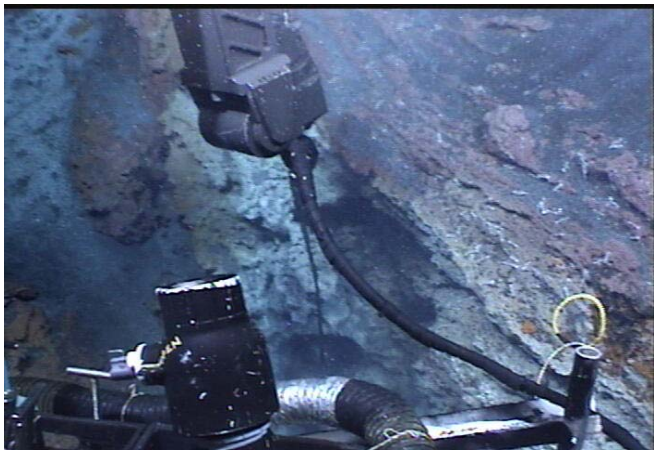
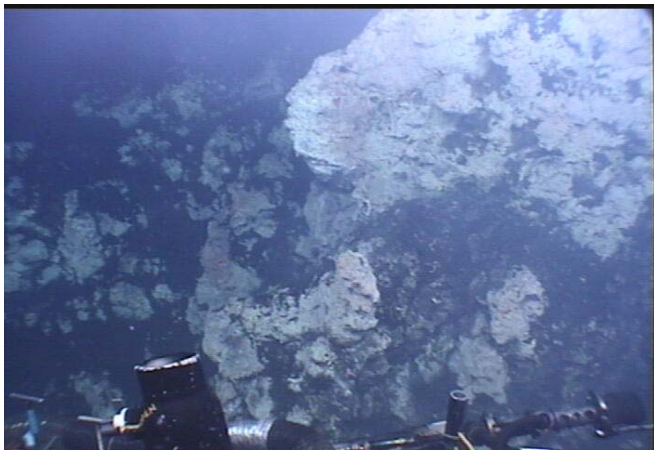
(left) Dive 416 2009/05/09 14:25:07 Taking black major in 315°C orifice. depth 1525, heading 140. **(right) Dive 416** 16:22 View of 315°C black smoker where all majors were taken at Maka volcano.

Dive J2-417 at West Mata

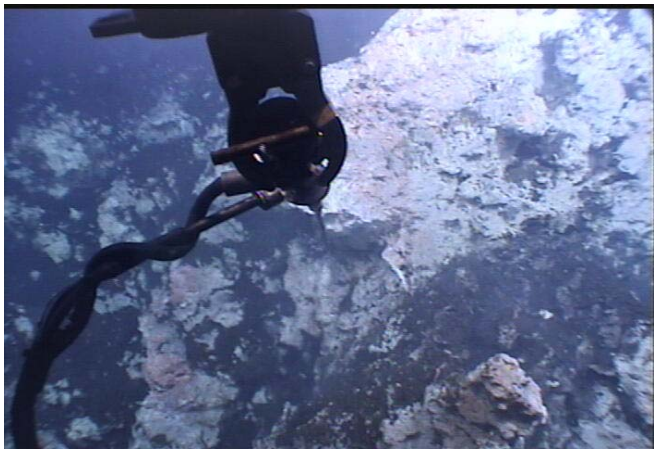
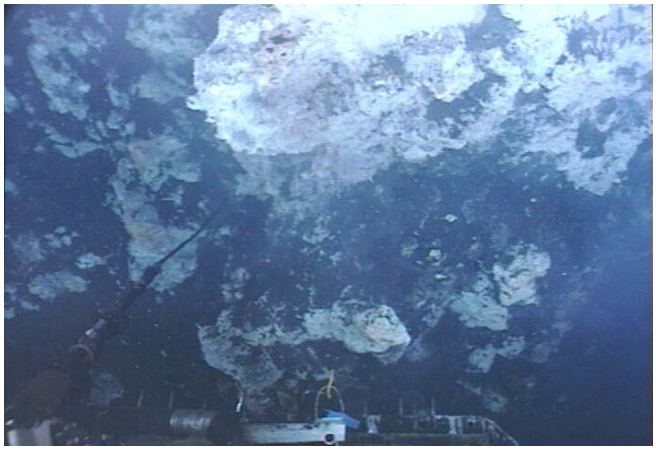



(left) Dive 417 2009/05/10 06:42:35 Mat Meadows area of intense white and some orange mat, on steep slope of volcaniclastic sediment at 1283m depth in SW area of summit, approx 200m from Hades volcanic vent. Very reminiscent of NW Rota-1. **(right) Dive 417** 2009/05/10 07:49:02. HFS sample setup at Luo near Mat Meadows, depth 1278.

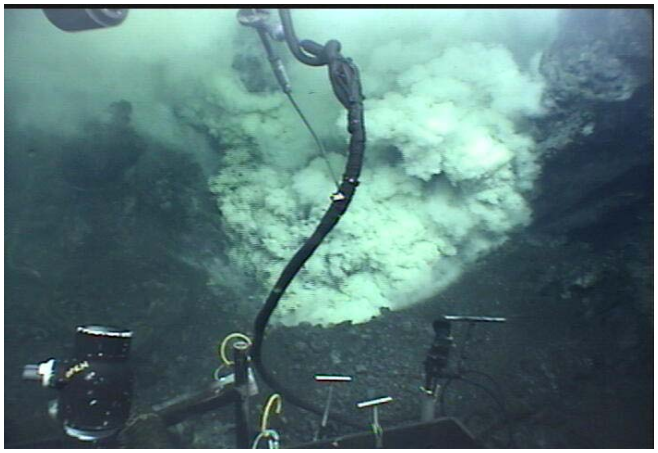
Dive J2-417 (cont.) at West Mata

(left) Dive 417 2009/05/10 07:57:28 Another view of the Luo sampling site, 1278m, heading 102. Temp up to 22.7°C and in-situ pH of 5.1. Took 4 samples, unfilt bag 21, filt piston 5, sterivex 15 and GFF 20. **(right) Dive 417** 2009/05/10 10:04:47 Wide view of "Epsilon" site (z=1187, heading 141) that is near Red Rock Ridge (z=1182, heading 41).

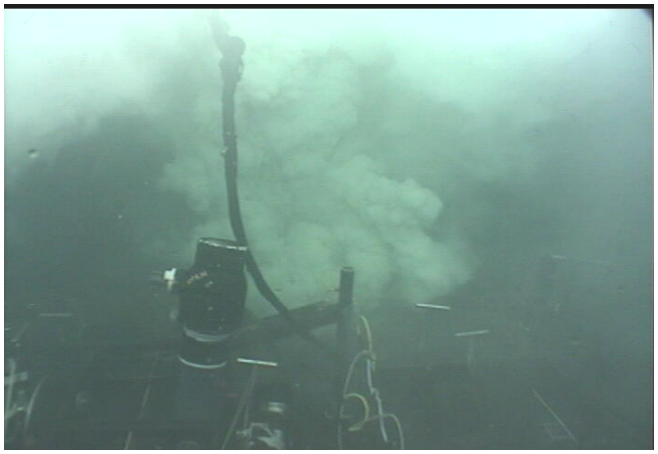
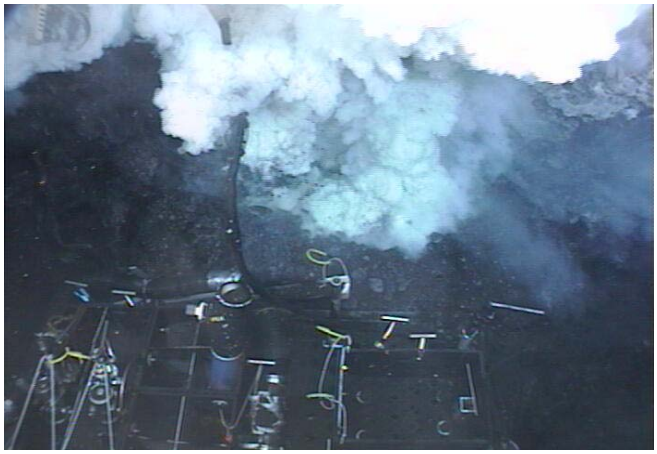



(left) Dive 417 2009/05/10 10:20:24 Measured average pH of 4.22 at 17.4°C, H2S voltage 0.281 at start of sampling, but the manifold was not flushing well. Later at this same site, got good flow, with pH of 2.599, H2S voltage 0.393, and average 28.0°C. **(right) Dive 417** 2009/05/10 10:31:13 Down-looking view of HFS setup at Epsilon site, near Red Rock Ridge.
Collected bag 22, 23 (failed), 19, sterivex 14. No gas-tight here.

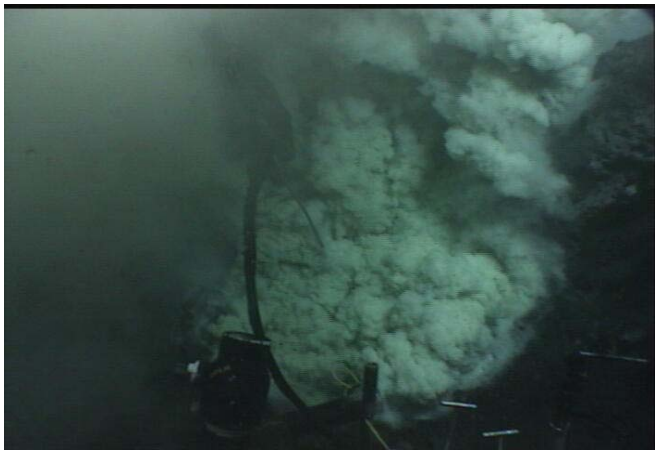



(left) Dive 417 2009/05/10 12:48:26 Prometheus vent. Z=/1174 heading 142. Sampling piston 2. **(right) Dive 417** 2009/05/10 12:55:10 Starting piston 3 at Prometheus.

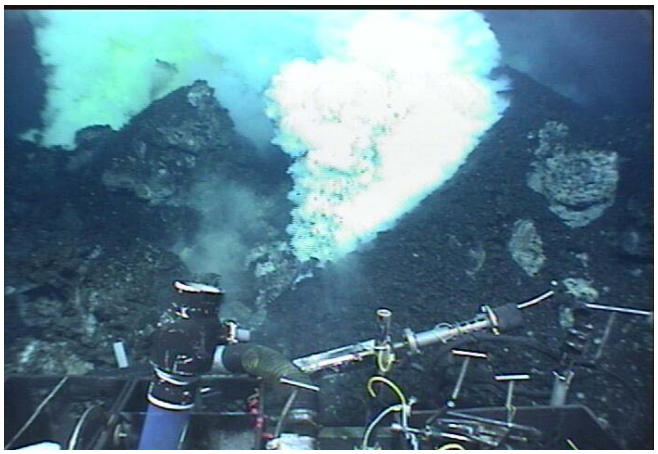
Dive J2-417 (cont.) at West Mata

(left) Dive 417 2009/05/10 12:56:29 Prometheus while taking piston 3. **(right) Dive 417** 13:00 View of Prometheus conditions at start of HFS piston 4.

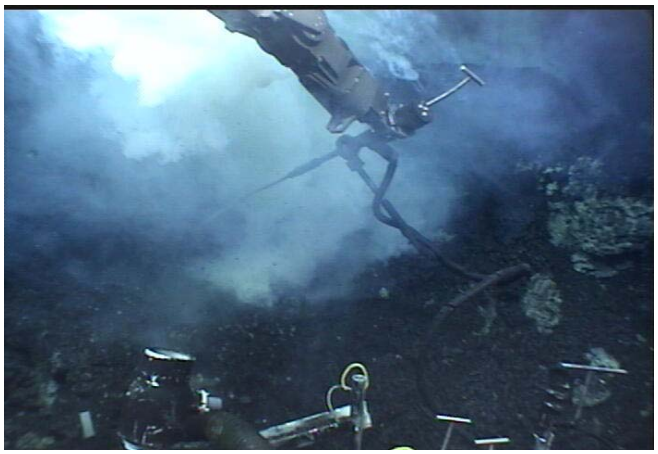
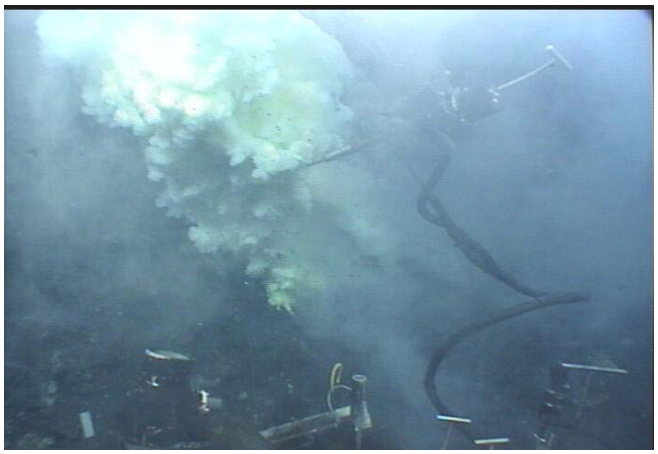



(left) Dive 417 2009/05/10 13:01 Taking HFS piston 4. **(right) Dive 417**, 13:07 Low-visibility conditions during sampling of bag 24. A tephra burst covered the vehicle during this period.

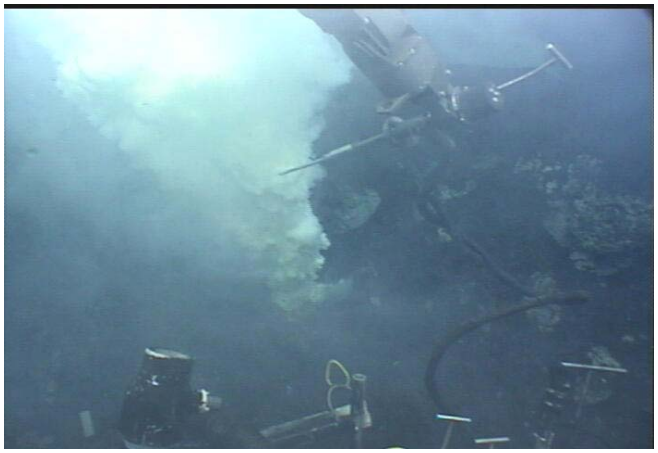



(left) Dive 417, 2009/05/10 16:17:28 View of Hades prior to sampling. **(right) Dive 417** 16:24 Z=1202m, heading 078, Hades vent at start of piston sample 6.

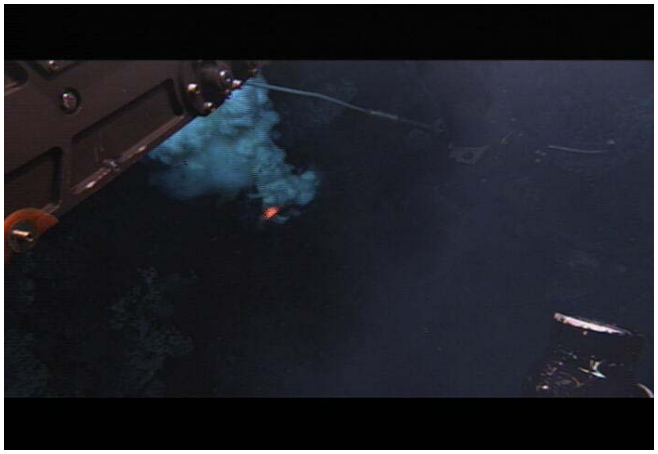
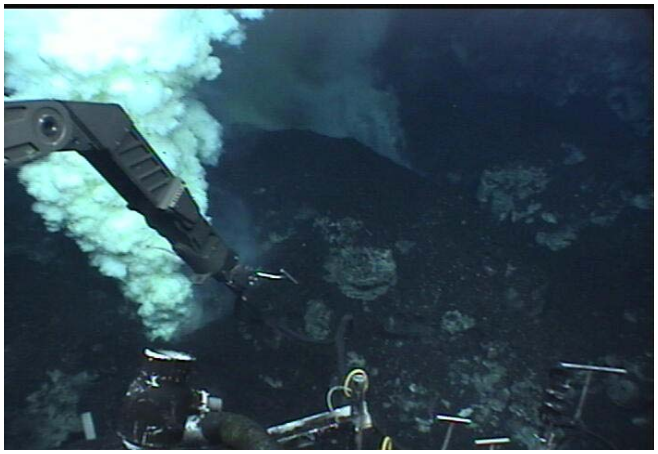
Dive J2-417 (cont.) at West Mata

(left) Dive 417 2009/05/10 16:27:29 Activity shifted while we were taking piston 6. **(right) Dive 417** 16:29:30 at Hades a few seconds before starting piston 8. Temperature up to 50.3°C max, and T2 up to 19°C.

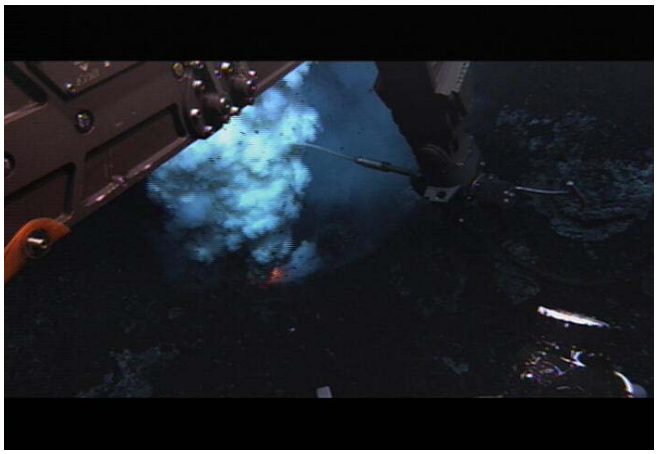



(left) Dive 417 2009/05/10 16:31:48. Near the end of piston 8, visibility now clearing after being near zero for much of the sample. **(right) Dive 417** 16:36 At Hades taking filtered piston 7. Example of low-visibility conditions.

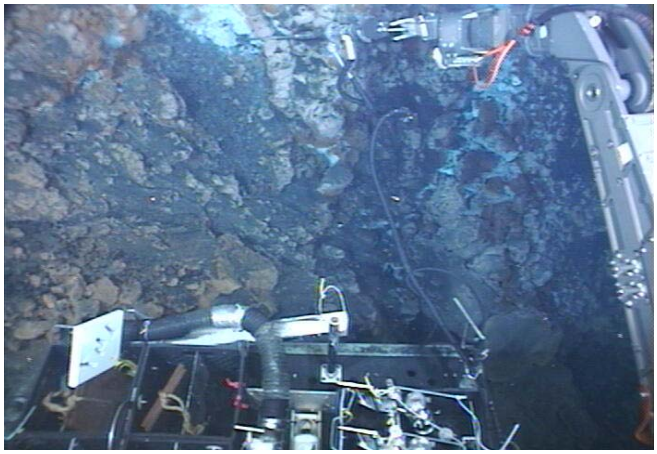
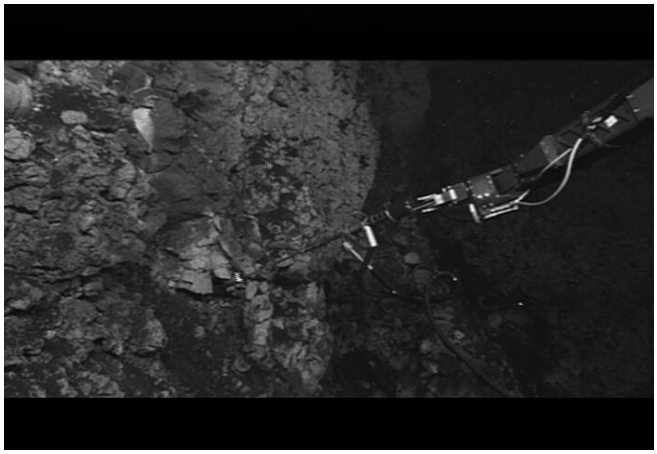
(left) Dive 417 2009/05/10 16:38 Red glow at Hades vent after piston 7. **(right) Dive 417** 16:48 At Hades starting piston 1.

Dives J2-417 (cont.) and J2-418 at West Mata




(left) Dive 417 2009/05/10 16:50 Sampling piston 1 above red glowing vent at Hades. **(right) Dive 417** 16:59 Close up of Hades glowing vent a few minutes after finishing sampling.

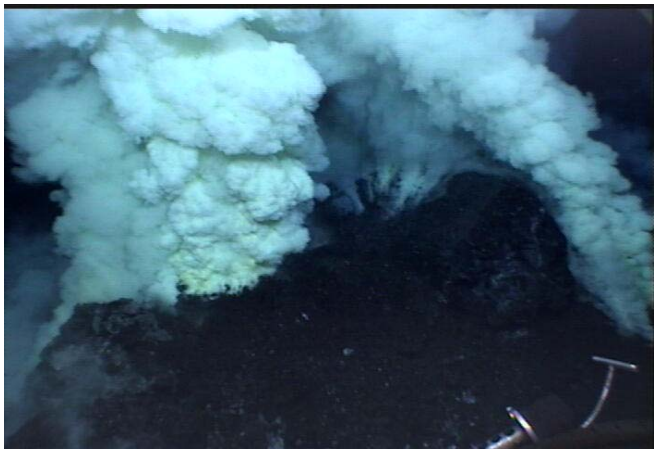

(left) Dive 418 2009/05/11 09:23 Z=1195 ROV heading 172. Initial sample setup for HFS at the "Creamsicle" site near the summit ridge crest and within 20-30 m (or less) of the Kohu site. **(right) Dive 418** 09:28:50 Creamsicle vent Z=/1194. 29°C.

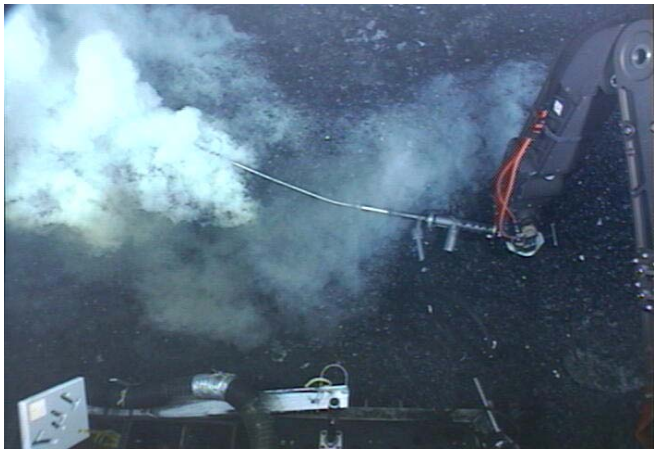
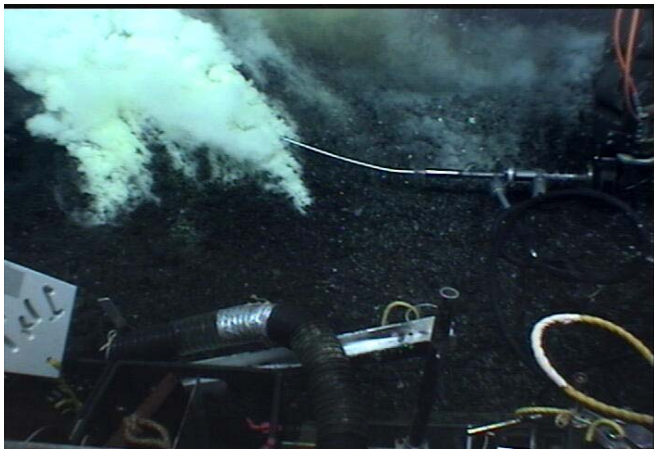
(left) Dive 418 2009/05/11 09:28:50 Wider view of Creamsicle site. **(right) Dive 418** 09:35:42 Another view of Creamsicle site. Heading 172.

Dive J2-418 (cont.) at West Mata


(left) Dive 418 2009/05/11 10:09 Small round marker #2 placed at the Creamsicle site on steep face. **(right) Dive 418** 11:50:06 At Hades vent (Z=1199 heading 075) prior to approach for sampling.



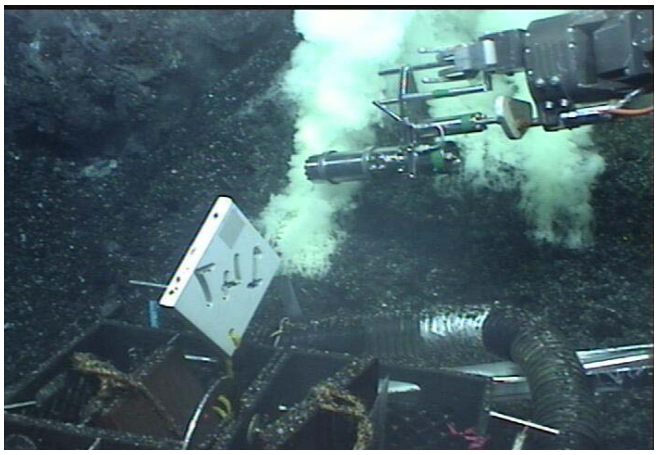

(left) Dive 418 2009/05/11 12:04 Multiple sources of white and yellow smoke at Hades vent prior to sampling, heading 097. **(right) Dive 418** 12:28:46 First sampling setup for HFS at Hades, heading 083. Measured temperature of 55 to 60°C in smoke coming out of volcaniclastic pile surrounding active lava/tephra eruption. Took pistons 1 and 2 and starboard gas-tight here.

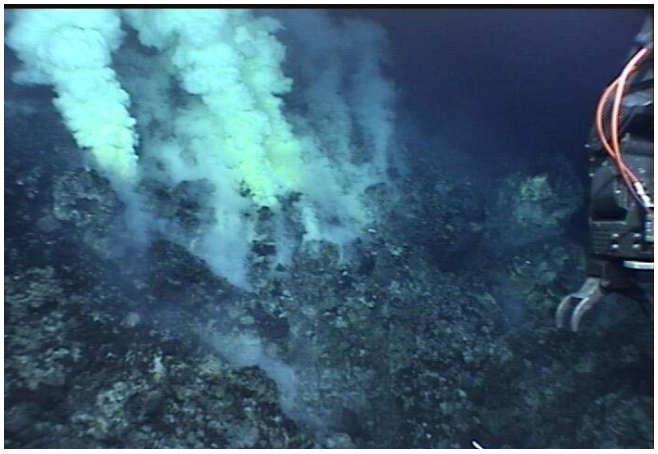
(left) Dive 418 2009/05/11 12:35 Different view of sample setup for piston 1 and port gas-tight. **(right) Dive 418** 12:40 Hades vent during filtered piston 2. Temperature up to 76°C at end of sample.

Dive J2-418 (cont.) at West Mata


(left) Dive 418 2009/05/11 12:44:39 Hades vent during unfiltered piston 4. Venting has remained stable for 15 minutes. **(right) Dive 418** 12:49 Hades vent sampling filtered bag 18. Conditions still stable. Diffuse white smoke venting in the foreground has decreased. Temperature measurements beneath the surface were 4°C in foreground, 114°C under the white smoke, and 162°C under the point where we sampled.

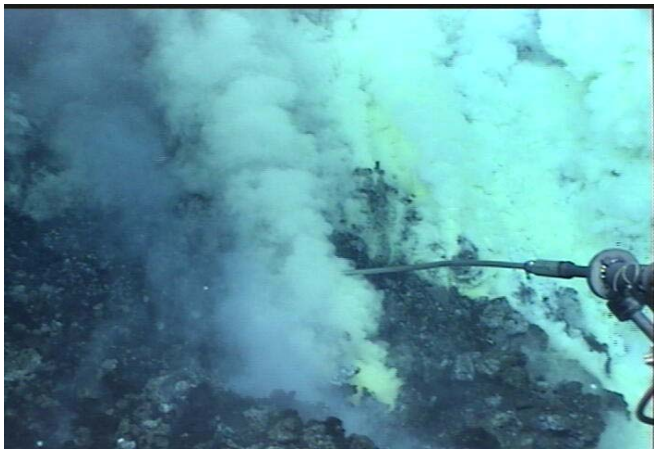
(left) Dive 418 2009/05/11 12:58 Reverse flow on HFS blowing out fine particles from the manifold. **(right) Dive 418** 13:20 Taking green discrete gas-tight at Hades, very close to the point of the fluid sample inlet for previous HFS samples here.



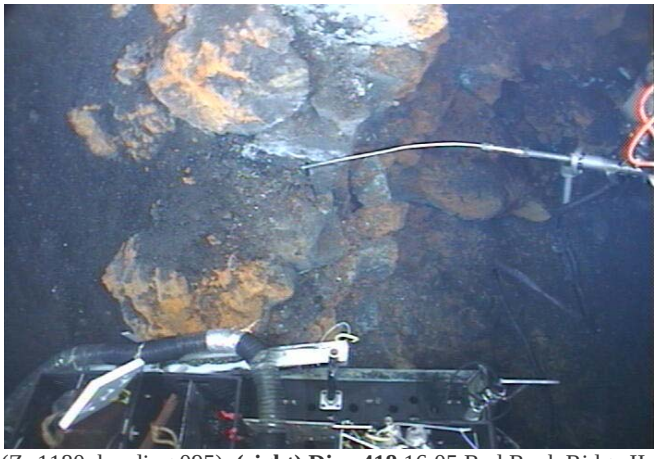

(left) Dive 418 2009/05/11 14:30 View of "Akel's Afi" (Z=1198 heading 220). This vent was flaming and producing some tephra. The flame would periodically light and extinguish itself. **(right) Dive 418** 14:37 Setting up to sample the jet on the left. The vent on the right is producing lots of tephra and flaming. The tephra would clog the sampler, so will try the one on the left.

Dive J2-418 (cont.) at West Mata


(left) Dive 418 2009/05/11 14:42 Conditions at start of filtered piston #5 at Afi vent. **(right) Dive 418** 14:43:47 Still taking HFS filtered piston 5 at Afi. Note tephra produced at vent to the right.

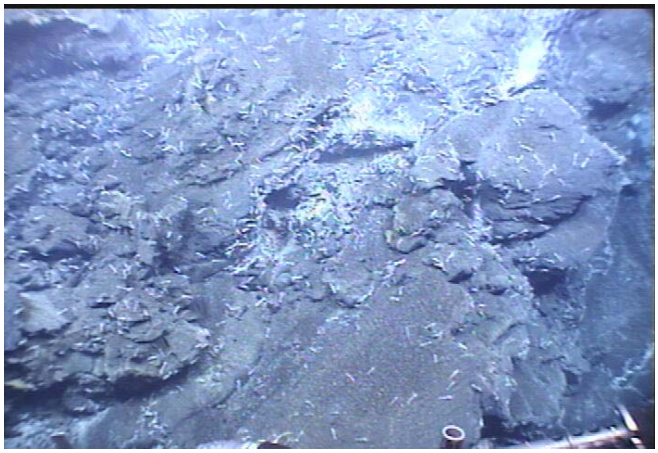



(left) Dive 418 2009/05/1114:49:43 Just after finishing unfiltered piston 6. **(right) Dive 418** 14:50:43 Fired starboard HFS gas-tight, T1=19°C.

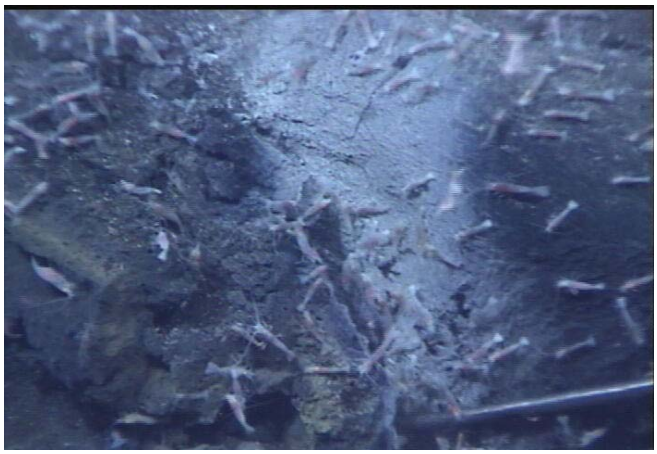



(left) Dive 418 2009/05/11 16:04 Red Rock Ridge II sampling setup. (Z=1180, heading 095). **(right) Dive 418** 16:05 Red Rock Ridge II setup.

Dive J2-418 (cont.) at West Mata

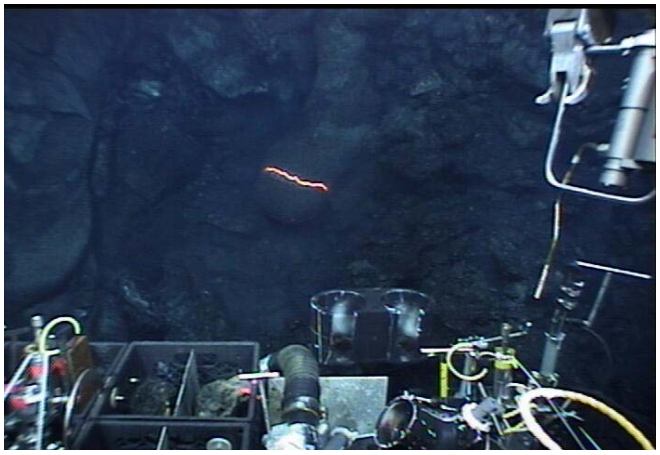


(left) Dive 418 2009/05/11 16:08 Close up of vent opening at Red Rock Ridge. Very weak flow was difficult to sample. **(right) Dive 418** 17:32 (Z=1176 heading 123). Shrimp City II site before starting sampling.

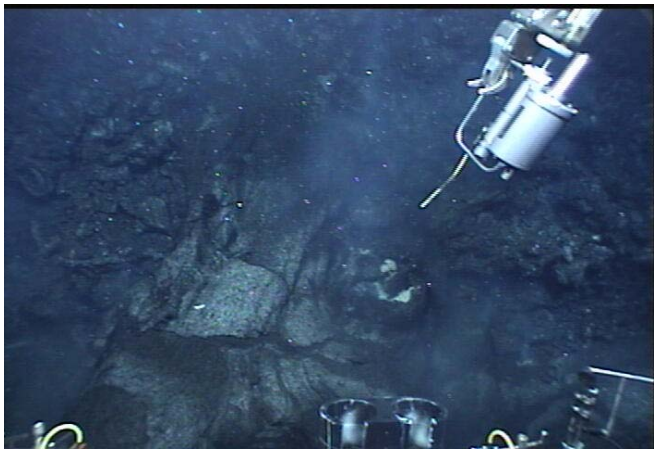


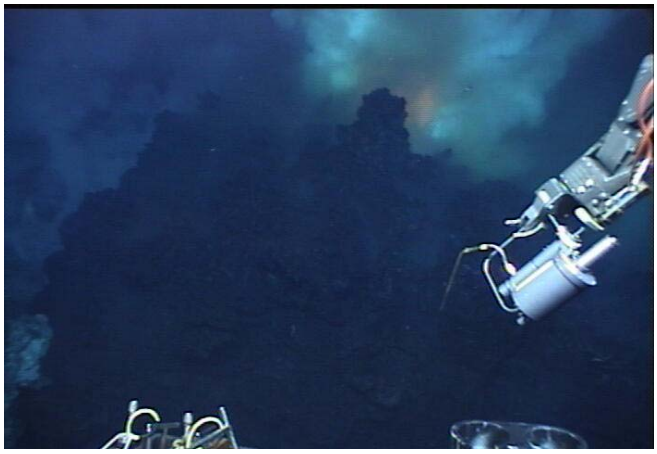
Dive 418 2009/05/11 17:53 Shrimp City II (Z=1175 hdg 120). HFS sampling in a crack venting 20°C fluid.

Dive J2-420 at West Mata

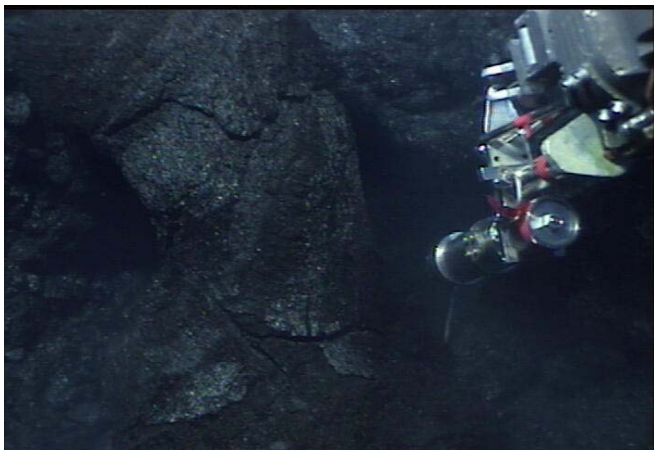


lDive 420 2009/05/12 21:21:18Preparing to take major sample at active pillow lava formation site.





(left) Dive 420 2009/05/12 21:22 (Z=1196 heading 16). Sampling grayish fluids emanating from actively forming pillow lava mound. Dive sample number 20, Black major #11C. **(right) Dive 420** 21:29 (Z=1194 heading 168). Flaming vent in background, preparing to take yellow major just below the view in this frame.



(left) Dive 420 21:31 Taking yellow major #6C in cloudy fluid emanating from recently formed pillow mound. This is 4 meters below the flaming volcanic vent. **(right) Dive 420** 21:36 Firing red gas-tight in same spot where two major samples were taken.

Hydrothermal Fluid Sample Distribution Summary

Notes

For samples, M=major sampler, B=unfiltered bag, BF=filtered bag, P=unfiltered piston, PF=filtered piston, FS=sterivex filter, F=glass fiber filter.
HFS sample volumes are measured by weighing bags or by measuring piston position and correcting for the extracted gas volume.

Sample splits were distributed to: M.L.=Marv Lilley, D.B.=Dave Butterfield, J.H.=Julie Huber, A-L.R.=Anna-Louise Reysenbach, J.C=Jim Cowen, A.B.=Annie Bourbonnais. N.K.=Nicole Keller, J.L.=John Lupton

Samp #	T max °C	T avg °C	Vent	pumpd vol ml	Start Time UTC	Measured or Calc Samp Wt (g): **Scientist:**	Gas head-space vol.: **M.L.**	Gas Fluid Aliquot: **M.L.**	H2S: **D.B.**	pH /Alk: **D.B.**	Micro: **J.H.**	Micro: **AL.R.**	Organics: **J.C.**	Sulfite: **D.B.**	Majors: **D.B.**	Nutrients: **D.B.**	O/H isotopes: **D.B.**	S isotopes: **N.K.**	N isotopes: **A.B.**	Trace Metals: **D.B.**	He: **J.L.**
J2-413 5/6/2009																					
Major	not meas		Prometheus	750	20:21		0	120	40	#				20	60	45	10			250	
J2-414 5/7/2009																					
P 1	31	31	Kohu		09:19:51	34	3			5											
B 24	31	30	Kohu	459	09:27:29	547	24	15	20	#	65	10	100	24	65			30		175	
P 4	32	31	Kohu	535	09:33:38	678	19	14	25	#			105	24	60	40	10		40		
F 20	32	31	Kohu	3025	09:48:44	to J.H.															
FS 15	32	30	Kohu	3002	10:06:40	to J.C.															
B 23	15	15	Shrimp City	501	11:09:25	356	0	14	25	#	65			18	45	45	10			115	
BF 19	15	15	Shrimp City	501	11:15:22	601	0	14	20	#			100	24	50	45	10	60	40	160	
FS 14	15	15	Shrimp City	3002	11:33:03	to J.H.															
PF 2	48	30	Prometheus	451	12:56:59	empty															
PF 3	70	59	Prometheus	354	13:00:55	empty															
PF 5	26	23	Prometheus	385	13:11:02	empty															
P 6	40	28	Prometheus	116	13:30:43	117	12	14	15	5					60					20	
PF 7	42	38	Prometheus	319	13:55:35	41	3	15		5											
P 8	46	43	Prometheus		13:58:17	empty															

Samp #	T max °C	T avg °C	Vent	pumpd vol ml	Start Time UTC	Measured or Calc Samp Wt (g): **Scientist:**	Gas head-space vol.: **M.L.**	Gas Fluid Aliquot: **M.L.**	H2S: **D.B.**	pH /Alk: **D.B.**	Micro: **J.H.**	Micro: **AL.R.**	Organics: **J.C.**	Sulfite: **D.B.**	Majors: **D.B.**	Nutrients: **D.B.**	O/H isotopes: **D.B.**	S isotopes: **N.K.**	N isotopes: **A.B.**	Trace Metals: **D.B.**	He: **J.L.**
BF 16	17	16	Red Rock Ridge	501	16:04:48	empty															
B 21	17	17	Red Rock Ridge	602	16:09:46	empty															
F 10	18	18	Red Rock Ridge	2002	16:21:50	empty															
BF 17	3.4	3.1	Red Rock Ridge	501	16:51:48	empty															
J2-415 5/8/2009																					
M1C-green	21		NELSC diffuse	750	14:44			6	30	#	65			15	65	45	10		45	450	
M6C-yellow	2.5		background	750				100	40						65	40	24		40	400	
J2-416 5/9/2009																					
M11C-black	315		Maka chimney	750	14:25	note: leaked 70ml		20	20	#			110	15	65	40	10	60		260	
M1C-green	315		Maka chimney	750	14:29	note: some gas pressure		15	20	#			100	15	60	40		60		250	
M10C-red	315		Maka chimney	750	16:13	note: leaked 120ml		15	20	#			100	15	65	45	15	60	45	200	
M6C-yellow	315		Maka chimney	750	16:16	note: leaked 30ml		0	20	#					65		10			450	
J2-417 5/10/2009																					
B 21	22	22	Luo	550	07:58:10	623	10	15	25	#	40		10	15	50	40	10			125	#
FS 15	22	20	Luo	3002	08:02:47	to J.H.															
PF 5	21	19	Luo	500	08:20:13	594	11	13	25	#				15	60	40	10		40	275	
F 20	23	21	Luo	5000	08:24:59	to J.C.															
B 22	30	29	Epsilon	354	10:27:24	384	13.5	13	20	#	40		72	15	40					100	

Samp #	T max °C	T avg °C	Vent	pumpd vol ml	Start Time UTC	Measured or Calc Samp Wt (g): **Scientist:**	Gas head-space vol.: **M.L.**	Gas Fluid Aliquo t: **M.L.**	H2S: **D.B.**	pH /Alk: **D.B.**	Micr o: **J.H.**	Micro: **AL.R.**	Organic s: **J.C.**	Sulfite : **D.B.**	Majors : **D.B.**	Nutrients: **D.B.**	O/H isotopes: **D.B.**	S isotopes: **N.K.**	N isotopes: **A.B.**	Trace Metals : **D.B.**	He: **J.L.**
B 23	31	26	Epsilon		10:38:28	10															
BF 19	33	32	Epsilon	500	10:50:07	590	0	13	30	#				15	60	40	10	60	40	220	#
FS 14	31	26	Epsilon	3002	10:54:46	to J.H.															
BF 16	3.7	3.6	near-bottom plume	454	12:32:24	538	0	100	25	#					65	40	10			220	
PF 2	14	6.2	Prometheus		12:48:19	114	0	13	25	5					10					25	
PF 3	45	16	Prometheus		12:55:35	80	17	13	14	5				15						30	
P 4	61	16	Prometheus		13:00:38	486	78	13	15	#				15	65	30	10	65		190	
B 24	13	7.2	Prometheus	331	13:07:24	399	36	15	25	#	40	10	10	18	40		10			125	#
PF 9	3.3	3.2	ambient sw	556	14:57:50	518	32	100	30	#					65	45	10			200	
P 6	43	19	Hades	412	16:23:49	462	45	13	15	#				18	65	45	10			250	
P 8	50	43	Hades	491	16:29:57	536	127	13	25	#	40		10	18	40	35	10	60*			#
PF 7	49	48	Hades		16:33:37	34		18		5					15						
P 1	49	40	Hades	365	16:47:58	401	50	28	15	#				18	65	40	10			180	
J2-418 5/11/2009																					
B 21	29	29	Creamsicle	550	09:30:33	628	0	13	20	#	40		100	15	65	40	10	65	40		
BF 19	29	29	Creamsicle	551	09:34:19	640	0	15	25	#		68	118	15	65	45	10			250	
FS 15	29	29	Creamsicle	3002	09:38:13	to J.H.															
P 1	58	48	Hades	425	12:33:49	464	147	15	25	#	40	10	60	15	40		10			225	
PF 2	76	71	Hades	360	12:37:22	327	51	15	25	#				25	30	30	10	15		115	
P 4	74	59	Hades	485	12:43:29	488	122	15	25	#				15	55		10	68		265	
BF 18	76	54	Hades	183	12:48:46	237	58	15	20	5				30	30		12			125	
PF 5	28	21	Afi		14:42:51	68	2	15	5	5					12					20	
P 6	27	23	Afi	475	14:46:41	507	42	75	25	#	40	10	108	30	30		10	15		200	60F /30 G
B 24	14	13	Red Rock Ridge II	585	16:07:30	645	0	15	30	#		10	90	15	65	40	10	68		250	

Samp #	T max °C	T avg °C	Vent	pumpd vol ml	Start Time UTC	Measured or Calc Samp Wt (g): **Scientist:**	Gas head-space vol.: **M.L.**	Gas Fluid Aliquo t: **M.L.**	H2S: **D.B.**	pH /Alk: **D.B.**	Micr o: **J.H.**	Micro: **AL.R.**	Organic s: **J.C.**	Sulfite : **D.B.**	Majors : **D.B.**	Nutrients: **D.B.**	O/H isotopes: **D.B.**	S isotopes: **N.K.**	N isotopes: **A.B.**	Trace Metals : **D.B.**	He: **J.L.**
BF 16	9.8	9.1	Red Rock Ridge II	450	16:25:32	416	0	15	30	#				15	65	40				240	
FS 14	15	8.8	Red Rock Ridge II	3050	16:29:34	to J.H.															
F 20	16	14	Red Rock Ridge II	2155	16:48:15	to J.C.															
B 23	19	19	mixed-no good	580	17:02:50	388															
B 22	19	19	Shrimp City II	403	17:54:33	372	0.5	15	25	#	40	10	30	15	40	40	10			110	
BF 17	19	18	Shrimp City II	412	17:57:30	472	0.5	15	25	#				15	40	40	10	68		240	
PF 3	6.1	5.5	Shrimp City II	579	18:18:16	655	0	110	30	#				15	65	45					
J2-420 5/12/2009																					
11C-black	not meas		Hades/Afi	750	21:22			15	30	#			120		130	45				250	
M6C-yellow	not meas		Hades/Afi	750	21:31			20	30	#						40				500	

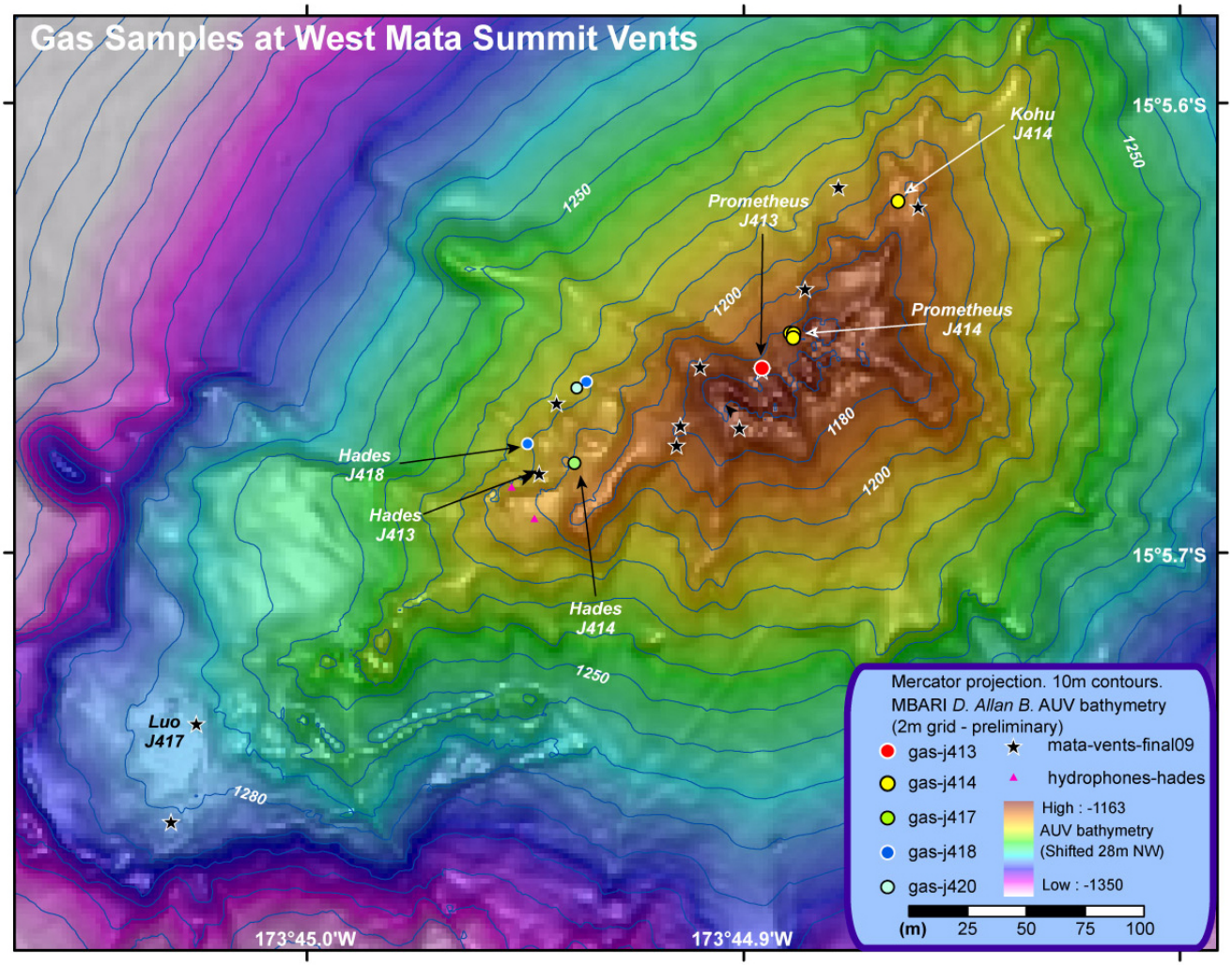


Figure 21. Gas samples at West Mata summit vents.

5.5.2 Summary of Dissolved Gases

Tamara Baumberger and Marv Lilley

Introduction

The primary objective of the analyses of dissolved gases, namely hydrogen and methane, on the response cruise was to confirm the finding of two active eruption sites during a recent expedition in November 2008 (TN227). The plume hydrogen measurements were instrumental to the discovery of the two eruptions during the November cruise. Hydrogen concentrations dissolved in the plume water samples as high as 15 µM were detected during that original cruise. Such high levels of hydrogen dissolved in the water column cannot be reached through magmatic hydrogen degassing. These high concentrations exclusively point to the reaction of host rock with hot seawater and give very strong evidence for ongoing or very recent eruptions at the seafloor. Methane concentrations are generally low in hot hydrothermal fluids and elevated in low temperature fluids in which methane is produced by microorganisms.

To fulfill the primary objective of the response cruise, 52 plume water samples obtained by a CTD/rosette package and 48 higher temperature bottom water samples obtained by ROV dives were analysed for hydrogen

and methane concentrations. All measurements were conducted with gas chromatography. Methane concentrations were determined by using a flame ionization detector (FID), whereas the hydrogen concentrations were measured with a helium-pulsed discharge detector (PDD). Table 1 shows a compilation of the sample types analysed for hydrogen and methane concentrations onboard the R/V Thompson during this expedition.

Shipboard Hydrogen and Methane Sample Summary

Date	Dive/Cast	Major samples / ROV dive	Beast samples / ROV dive	Niskin samples / ROV dive	Niskin samples / CTD cast	Total number of samples
5/6/09	J2-413	4		1		5
5/7/09	J2-414		6	2		8
5/7/09	V09C-01				12	12
5/7/09	T09C-01				9	9
5/8/09	J2-415	2				2
5/8/09	T09C-02				8	8
5/8/09	V09C-02				12	12
5/9/09	J2-416	3				3
5/10/09	J2-417		14	1		15
5/11/09	J2-418		13			13
5/12/09	J2-420	2				2
5/12/09	V09C-05				11	11
Total		**11**	**33**	**4**	**52**	**100**

Summary of samples obtained by CTD casts and ROV dives in the West Mata and the NELSC areas for shipboard hydrogen and methane analyses.

Summary of preliminary results

NELSC. The first eruption site discovered on the previous expedition was on a segment of the northeast Lau spreading center (NELSC). Hydrogen concentration measurements in the water column from November 2008 yielded values as high as 2.1 µM (Fig. 22). By comparison, water column samples collected at this site during this response expedition showed hydrogen concentration close to background levels. Additionally, the measured dissolved methane concentrations were near-background values. Thus, the dissolved gas analyses show no evidence for ongoing hydrothermal activity and suggest that the NELSC eruption detected in November 2008 was short lived.

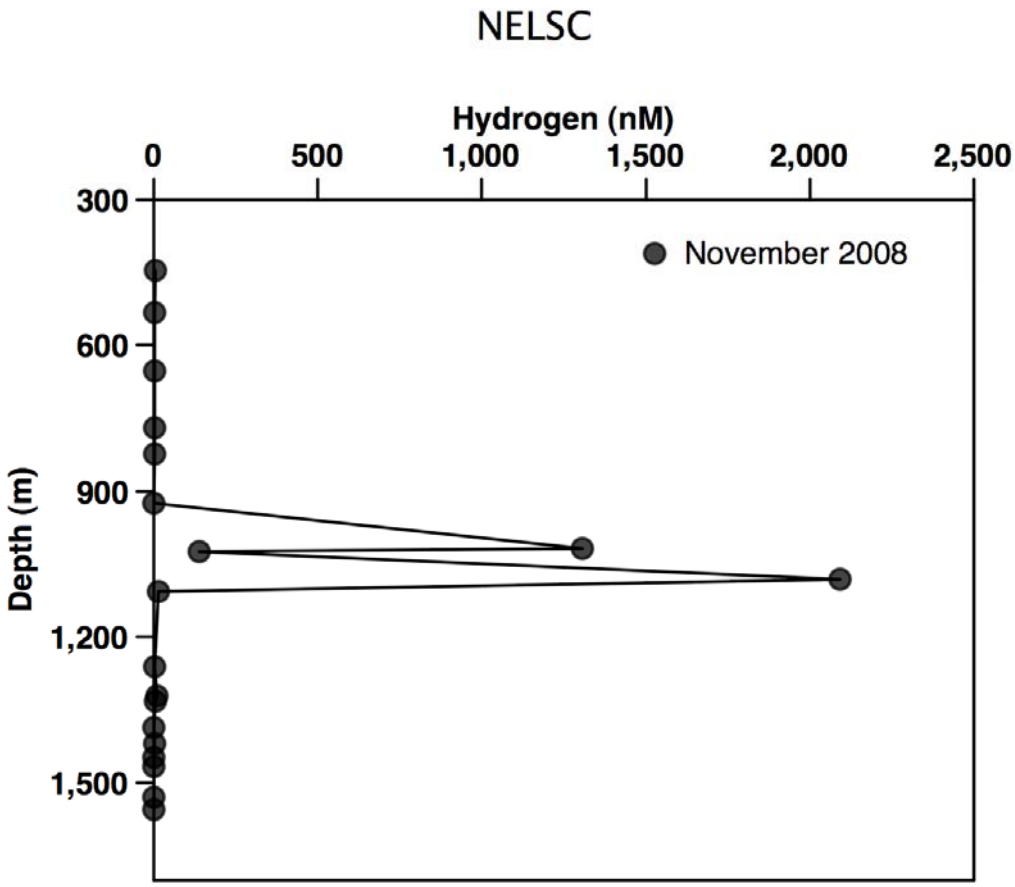


Figure 22. NELSC area. Concentration of dissolved hydrogen (in nM) measured in plume water samples in November 08.

West Mata. The second eruption site located in November 2008 was a submarine volcano named West Mata located northeast of the NELSC. At this eruption site, dissolved hydrogen concentrations up to 15 µM were detected in the plume water samples in November 2008. The plume water analyses conducted on this response expedition showed dissolved hydrogen concentrations up to 17.2 µM at a water depth of 1129 meters and 14.8 µM at 1146 meters water depth (Figure 23). These enormously high concentrations of dissolved hydrogen in the water column pointed to ongoing volcanic eruptions at the seafloor. Associated with these eruptions, the intense hydrothermal plume rising up to between 1100 and 1150 meters water depth provided initial information about the ongoing hydrothermal activity. The dissolved methane concentrations in the water column determined at West Mata were not distinct from background values.

A comparison to the data obtained in November 2008, show (see graph below) that the hydrogen concentrations dissolved in the hydrothermal plume were still in the same range as six months previously. These observations suggested ongoing volcanic activity at West Mata. This was confirmed by the observations outlined here of an ongoing eruption at the summit of W. Mata. The high temperature fluid samples obtained by ROV dives need further shore-based analyses before the results can be discussed.

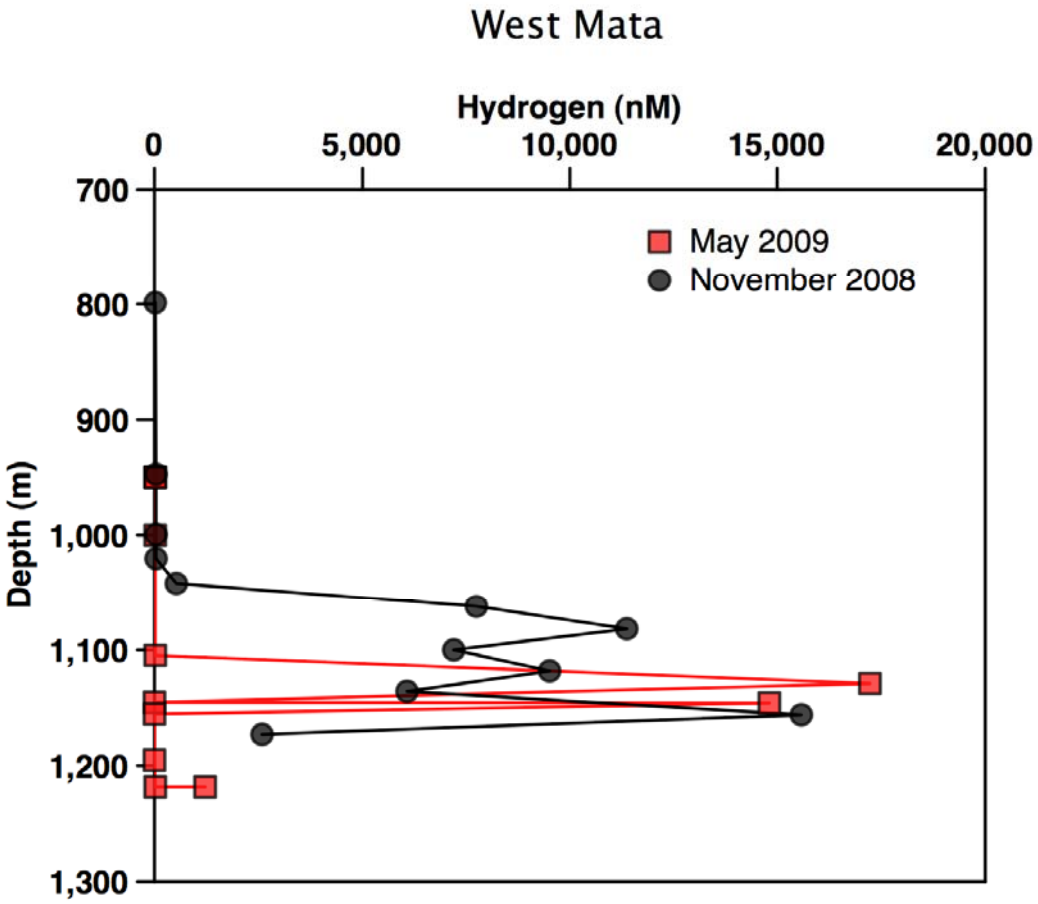


Figure 23. West Mata eruption site. Concentration of dissolved hydrogen (in nM) measured in plume water samples in May 2009 (red) compared to the dissolved hydrogen concentrations measured in corresponding samples in November 2008 (black).

5.5.3 Helium Isotope Lab Gas Sampling

Leigh Evans and John Lupton

The majority of the samples for gas analysis were collected in special titanium gas-tight bottles with ~150 cc internal volume. In a few cases subsamples from the hydrothermal fluid sampler (HFS) were drawn into evacuated flasks or into gas syringes and then processed on the seagoing vacuum line. For the 2009 Northern Lau Basin response cruise, most of the ~20 samples of vent fluid for gas analysis came from the West Mata Volcano eruptive areas. In terms of their gas contents, these samples ranged from background seawater to nearly 100 millimoles per kilogram. The Prometheus and Hades vents were quite variable in gas concentration. A variety of factors contributed to this. Among other factors, the rate of change of the most intense activity and the intensity of that activity made it difficult to access venting in the same manner as a focused flow vent. The samples with the highest gas concentrations were obtained using the HFS sampling manifold as the input to gastight bottles. The present equipment (plastic funnel) did not allow for the collection of gas bubbles, which were only rarely observed here. The other site, Maka, exhibited reproducible gas concentration at 80 millimoles per kilogram. For gas sample locations at West Mata see figure 21. For gas sample locations on all dives refer to section 3.4 figures 6 through 12.

NELRC Gas Samples

Dive 'n sample	sampler	descriptor	Vent	fluid wt. (g)	Vent T [C]	[gas] m-mole/kg
J2-413-11	GTB 2	green	Prometheus	160		3.2
J2-414-20	GTB 5	B&W	Prometheus smoke	149		64.3
J2-414-16	GTB 9	stbd HFS	Prometheus	165	62 - 78	99.5
J2-414-21	GTB 7	B&O	Prometheus, above fire	168		41.7
J2-414-7	GTB 11	port HFS	Kohu	168	31	19.0
J2-415-17	GTB 6	nude	SW-NELSC worm mkr	172	21	4.9
J2-416-14	GTB 11	yellow	Maka- mk149	143	316	83.5
J2-416-20	GTB 5	B&W	Maka area	143		29.7
J2-416-13	GTB 2	green	Maka	140	315	81.4
J2-416-19	GTB 7	B&O	Maka	148		81.8
J2-417-24	GTB 9	stbd HFS	Hades	165	50	23.6
J2-417-23	GTB 11	port HFS	Hades	167	50	29.3
J2-417-18	HFS bag 24	flask 17	Prometheus	32	13.4	12.7
J2-417-12	HFS bag 19	flask 15	Epsilon mkr 147	30	33	20.1
J2-417-5	HFS bag 21	flask 22	Luo	35	22.4	15.6
J2-418-13	GTB 7	port HFS	Hades	125	55, 76, 95 max	61.1
J2-418-24	GTB 9	stbd HFS	Akel's Ahi	165	21	12.6
J2-418-17	GTB 2	green	Hades	181	55, 76, 95 max	46.4
J2-418-23	Piston 6	flask 17	Akel's Ahi	18		13.9
J2-420-22	GTB 9	red	Hades- diff below fire zone	166		2.5
headspace subsamples						**cc STP gas**
J2-417-18	HFS bag 24	60ml syringe	Prometheus headspace			56.4
J2-418-23	Piston 6	30ml syringe	Akel's Ahi headspace			22.2

5.6 HYDROTHERMAL PLUME STUDIES

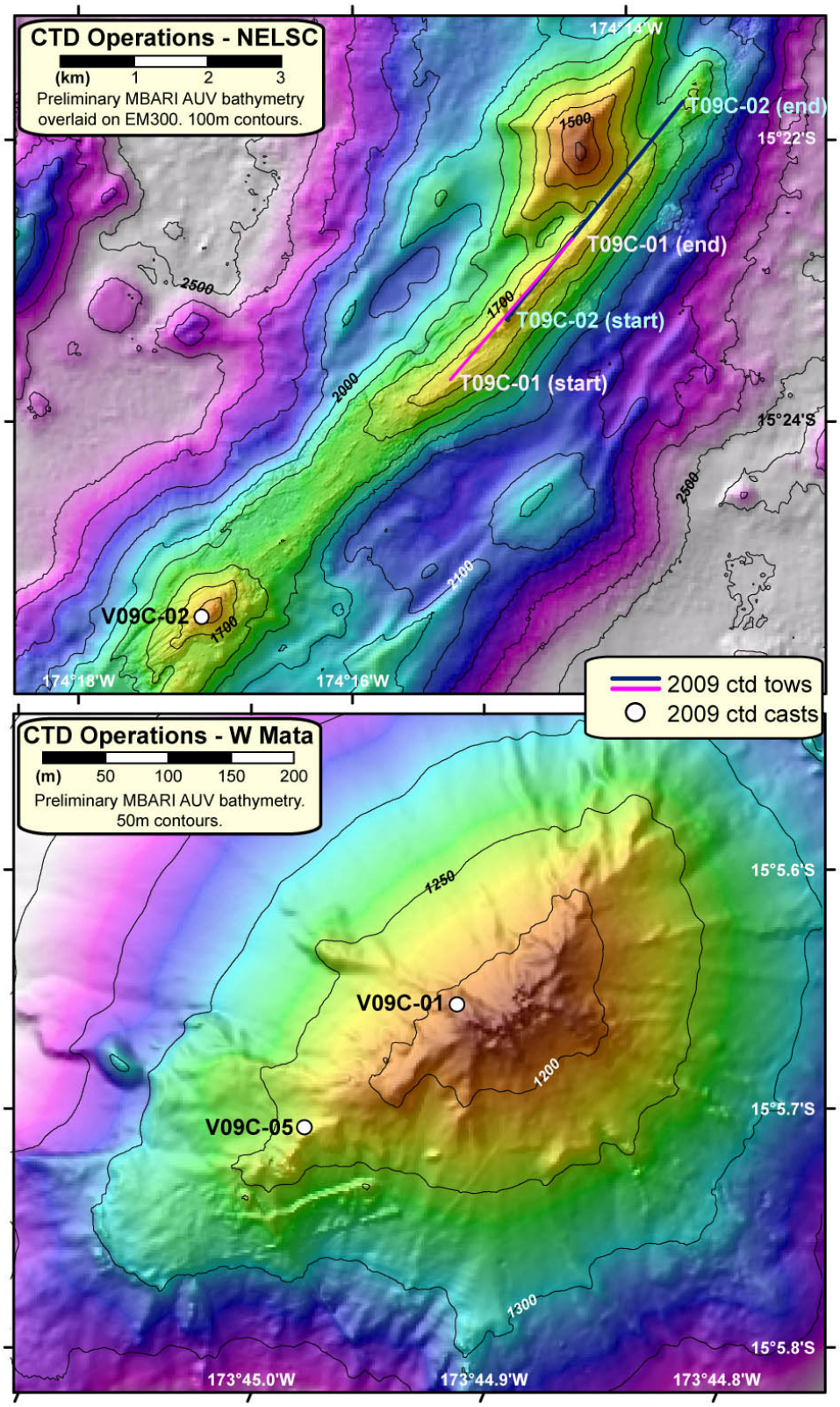


Figure 24. CTD operations. NELRC – TN234

5.6.1 CTD Operations

Edward Baker, Joseph Resing, Sharon Walker, Nathan Buck

The primary objectives of the CTD operations were to conduct vertical casts and tows to have water column measurements coincident with seafloor observations at the eruptive sites, assess the impact of the volcanic eruptions on the water column surrounding the volcanoes, acquire discrete water samples for chemical analyses, and compare measurements acquired during this cruise with those from the earlier cruise (November 2008). A total of 7 CTD casts (5 vertical casts and 2 tows were conducted at the two eruptive sites during this 8-day cruise. See figure 24 for CTD cast locations. One vertical cast was aborted at a depth of 280m due to problems with the CTD and another vertical cast reached only 1680 m due to the same problem. Sensors on the CTD included the standard CTD sensors (conductivity, temperature and pressure) as well as oxygen, optical backscattering, optical transmission, oxidation-reduction potential (ORP), fluorescence, and an altimeter. A total of 242 water samples were taken for the following analyses: helium (52 samples), methane and hydrogen (53), pH (53), total carbon dioxide (17), total dissolvable metals (38), dissolved metals (7), particulate bulk chemistry (7), particle morphology/type (2), and microbiology (13). Some analysis of water samples was completed at sea, while others need to be analyzed in the lab on shore.

W Mata

W Mata volcano was undergoing an active volcanic eruption during the survey. The Jason dives located at least two active eruptive vents very near the summit. Two vertical casts over the summit, and one vertical cast over the west flank of the volcano provided measurements and samples from the plumes coming from the eruptive vents. The plume over the summit of W Mata volcano was optically intense, rose to about 1075 m (a height of about ~125 m above the eruptive vents) and had strong ORP anomalies (see fig. 25 below). The cast over the western flank of the volcano was to look for evidence of deep particle layers similar to those found at NW Rota-1 volcano in the Mariana Arc. The cast reached a depth of 1670 m and no prominent particle layers were present deeper than 1075 m, the same depth as the plume over the summit, however, the seafloor depth at the cast location was ~2650 m so this cast may have missed the presence of particles being carried downslope along the flank via sediment gravity flows.

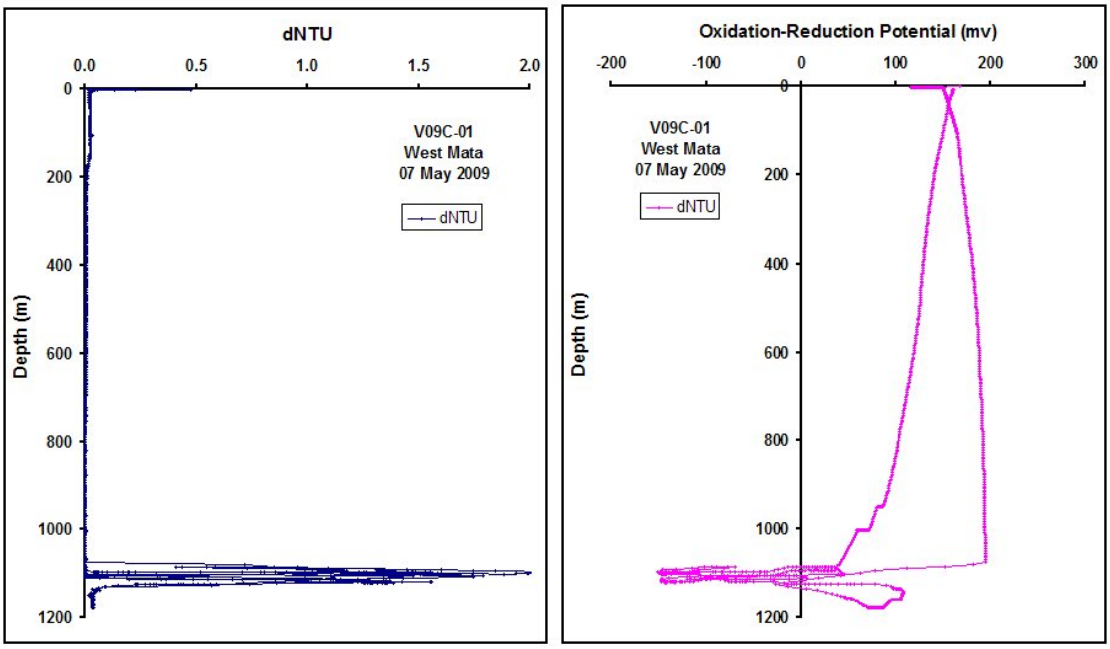


Figure 25. Profiles of particle (dNTU) and oxidation-reduction potential anomalies at W Mata volcano, May 2009.

NELSC

The intense, multi-layered plumes observed over the NELSC during the November 2008 cruise were no longer present. Two CTD tows along the area where intense temperature anomalies were measured in November 2008 showed no sign of continuing eruptive activity (See NELSC fig. 26 below).

The Maka vent site, located at the south end of the NELSC, hosts black smoker vents with multiple chimneys and vent orifices. The depth range of the vent sites visited on J2-416 is 1520 to 1540 m. One vertical cast was done at the Maka site during this cruise. Two distinct plume layers were present, centered at about 1430 and 1515 m, and were sampled.

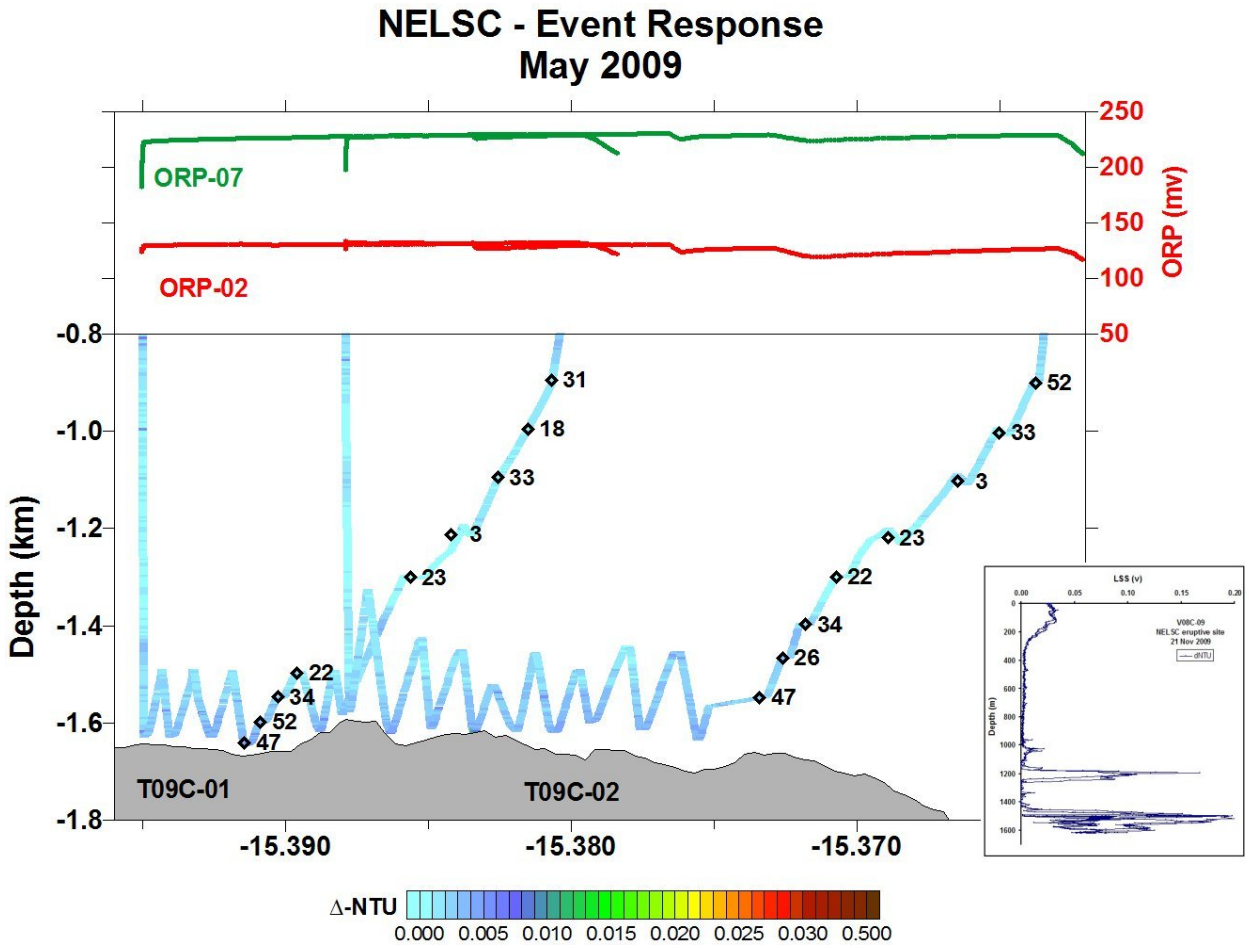


Figure 26. NELSC: The CTD tow track for T09C-01 and T09C-02 colored to represent the particle concentration as measured by the optical backscatter sensor (dNTU). The red and green at the top of the figure are the oxidation-reduction potential (mv) from two different sensors. Inset shows a vertical cast profile (located at approximately the same location as the downcast of T09C-02 at 15.388°S) of dNTU from the November 2008 cruise for comparison. Water bottle samples are indicated by black diamonds and labeled with the bottle number.

CTD Sample Types, Abbreviations, Numbers, and PI

Sample type	Abbreviation	# of samples	Responsible PI
Helium isotope analysis	3He	52	John Lupton, *NOAA PMEL, Newport OR*
Methane and hydrogen	CH4, H2	53	Marv Lilley, *UW, Seattle WA*
pH (acidity)	pH	53	Joseph Resing, *UW / NOAA PMEL Seattle WA*
Total carbon dioxide	TCO2	17	Joseph Resing
Total dissolvable trace metals	TDMe	38	Joseph Resing
Dissolved trace metals	DMe	7	Joseph Resing
Particulate bulk chemistry	XRF	7	Joseph Resing
Particle morphology and type	SEM	2	Joseph Resing
Microbiology	Micro	13	Julie Huber, Jim Cowen *MBL and UH respectively*

CTD Vertical Casts and Tows (NELRC – TN234)

Cast	StaName	Star t/ End	pH	3He	H2&CH4	CO2	TDMe	DMe	XRF	SEM	Micro bio	Comments	latitude	longitude
1	V09C-01	May-07-19:28:20	12	12	12	6	11	3	3		5	West Mata	-15.094278	-173.748523
		May-07-20:42:50												
	T09C-01(start)	May-08-02:45:24											-15.395050	-174.254700
2	T09C-01(end)	May-08-04:26:18	9	9	9		5				3	NELSC - S end of eruption area	-15.378367	-174.239800
	T09C-02(start)	May-08-19:37:25											-15.387893	-174.247892
3	T09C-02(end)	May-08-21:53:13	8	8	8							NELSC - continuing N along eruption area	-15.362100	-174.226367
4	V09C-02	May-08-23:04:04	12	12	12	6	11	2	2		5	Maka	-15.423150	-174.284933
		May-09-00:18:03												
5	V09C-03	May-10-19:43:16	NO SAMPLES									west base of W Mata - CTD failed at 1680m during downcast	-15.102917	-173.774950
		May-10-20:14:26												
6	V09C-04	May-10-21:25:31	NO SAMPLES									W Mata - CTD failed at 280m during downcast	-15.094317	-173.748200
		May-10-21:32:16												
7	V09C-05	May-13-04:59:05	12	11	12	5	11	2	2	2		W Mata - over Hades	-15.095133	-173.749617
		May-13-05:57:05												
	totals:	**242**	**53**	**52**	**53**	**17**	**38**	**7**	**7**	**2**	**13**			

5.7 PUBLIC OUTREACH

Susan Merle

http://laueruptions.blogspot.com/

During the expedition text and images were posted to the above URL. Prior to the expedition a background piece, was posted as well as biographies of the participating scientists. Eight pieces were posted during the 7 day expedition, with contributions from several of the principal investigators. Video was not posted to the website due to time constraints and copyright concerns. In the near future the site will be copied to the NOAA Vents Program website and videos will be posted when they are made available.

The **Jason virtual van** has images from science, pilot and brow cams as well as navigation, times and dive log comments from the cruise. The Jason virtual van URL is: http://4dgeo.whoi.edu/jason/

5.8 VIDEO AND IMAGERY INFORMATION

As on the previous Jason expedition (TN232 NW Rota), a prototype HDTV camera mounted on Jason replaced the 3-chip science camera used in the past. Funding for the HD video and framegrabs, as well as DSC (digital still cam) framegrabs was provided by NSF. The high definition video was recorded as highlights to 21 HDTV tapes amounting to about 40 hours of HD highlight video. The HD video was also downgraded to standard format and recorded continuously to DVCam tapes (provided by the science party) and to DVD (standard Jason product). Three cameras recorded throughout each dive. 1) Science Cam - (HDTV camera for all dives except J2-420, when it wasn't working due to fiber-optic problems). This was obviously the best quality video. Most members of the science party received the down-converted HD video data on DVD. 2) Pilot Cam - standard definition, single chip camera used mainly for pilot navigation, mounted below Jason. 3) Brow Cam - standard definition, single chip camera mounted higher on Jason. Maryann Keith (WHOI) supported the HDTV operations at sea.

Credits/Copyright information for the high definition video: All high-definition video by Advanced Imaging and Visualization Lab, copyright WHOI

SC – Science Cam
PC – Pilot Cam
BC – Brow Cam

HDTV Copies 1-4 were copied from HD highlight tapes during J2-413, when Science Camera feed had synch problems caused by errant use of the HDTV remote control.
DVD's have audio time code in right audio channel and FSK JASON data or Audio Commentary encoded in the left audio channel.

Jason DVD Video List

DVD_Id	Start Date/Time	End Date/Time	Lowering	Comments
DVD-001-PC-A	2009/05/06 16:02	2009/05/06 18:02	J2-413	***elongate pillows; rock samples; eruption***
DVD-001-SC-A	2009/05/06 16:02	2009/05/06 18:02	J2-413	***elongate pillows; rock samples; eruption***
DVD-002-BC-A	2009/05/06 18:01	2009/05/06 20:00	J2-413	
DVD-002-PC-A	2009/05/06 18:01	2009/05/06 20:00	J2-413	
DVD-002-SC-A	2009/05/06 18:01	2009/05/06 20:00	J2-413	***synch problem***
DVD-003-BC-A	2009/05/06 19:55	2009/05/06 21:55	J2-413	
DVD-003-PC-A	2009/05/06 19:55	2009/05/06 21:55	J2-413	
DVD-003-SC-A	2009/05/06 19:55	2009/05/06 21:55	J2-413	***synch problem***
DVD-004-BC-A	2009/05/06 21:50	2009/05/06 22:30	J2-413	
DVD-004-PC-A	2009/05/06 21:50	2009/05/06 22:30	J2-413	
DVD-004-SC-A	2009/05/06 21:50	2009/05/06 22:30	J2-413	***synch problem***
DVD-005-BC-A	2009/05/07 7:45	2009/05/07 9:46	J2-414	
DVD-005-PC-A	2009/05/07 7:45	2009/05/07 9:46	J2-414	
DVD-005-SC-A	2009/05/07 7:45	2009/05/07 9:46	J2-414	
DVD-006-BC-A	2009/05/07 9:43	2009/05/07 11:43	J2-414	
DVD-006-PC-A	2009/05/07 9:43	2009/05/07 11:43	J2-414	
DVD-006-SC-A	2009/05/07 9:43	2009/05/07 11:43	J2-414	
DVD-007-BC-A	2009/05/07 11:40	2009/05/07 13:40	J2-414	
DVD-007-PC-A	2009/05/07 11:40	2009/05/07 13:40	J2-414	
DVD-007-SC-A	2009/05/07 11:40	2009/05/07 13:40	J2-414	

DVD_Id	Start Date/Time	End Date/Time	Lowering	Comments
DVD-008-BC-A	2009/05/07 13:38	2009/05/07 15:39	J2-414	
DVD-008-PC-A	2009/05/07 13:38	2009/05/07 15:39	J2-414	
DVD-008-SC-A	2009/05/07 13:38	2009/05/07 15:39	J2-414	
DVD-009-BC-A	2009/05/07 15:37	2009/05/07 17:36	J2-414	
DVD-009-PC-A	2009/05/07 15:37	2009/05/07 17:36	J2-414	
DVD-009-SC-A	2009/05/07 15:37	2009/05/07 17:36	J2-414	
DVD-010-BC-A	2009/05/07 17:33	2009/05/07 18:04	J2-414	
DVD-010-PC-A	2009/05/07 17:33	2009/05/07 18:04	J2-414	
DVD-010-SC-A	2009/05/07 17:33	2009/05/07 18:04	J2-414	
DVD-011-BC-A	2009/05/08 6:53	2009/05/08 8:53	J2-415	
DVD-011-PC-A	2009/05/08 6:53	2009/05/08 8:53	J2-415	
DVD-011-SC-A	2009/05/08 6:53	2009/05/08 8:53	J2-415	
DVD-012-BC-A	2009/05/08 8:50	2009/05/08 10:50	J2-415	
DVD-012-PC-A	2009/05/08 8:50	2009/05/08 10:50	J2-415	
DVD-012-SC-A	2009/05/08 8:50	2009/05/08 10:50	J2-415	
DVD-013-BC-A	2009/05/08 10:46	2009/05/08 12:46	J2-415	
DVD-013-PC-A	2009/05/08 10:46	2009/05/08 12:46	J2-415	
DVD-013-SC-A	2009/05/08 10:46	2009/05/08 12:46	J2-415	
DVD-014-BC-A	2009/05/08 12:44	2009/05/08 14:45	J2-415	
DVD-014-PC-A	2009/05/08 12:44	2009/05/08 14:45	J2-415	
DVD-014-SC-A	2009/05/08 12:44	2009/05/08 14:45	J2-415	
DVD-015-BC-A	2009/05/08 14:40	2009/05/08 16:40	J2-415	
DVD-015-PC-A	2009/05/08 14:40	2009/05/08 16:40	J2-415	
DVD-015-SC-A	2009/05/08 14:40	2009/05/08 16:40	J2-415	
DVD-016-BC-A	2009/05/08 16:39	2009/05/08 18:10	J2-415	
DVD-016-PC-A	2009/05/08 16:39	2009/05/08 18:10	J2-415	
DVD-016-SC-A	2009/05/08 16:39	2009/05/08 18:10	J2-415	
DVD-017-BC-A	2009/05/09 4:20	2009/05/09 6:20	J2-416	
DVD-017-PC-A	2009/05/09 4:20	2009/05/09 6:20	J2-416	
DVD-017-SC-A	2009/05/09 4:20	2009/05/09 6:20	J2-416	
DVD-018-BC-A	2009/05/09 6:18	2009/05/09 7:32	J2-416	***Stopped early for mid-water transit***
DVD-018-PC-A	2009/05/09 6:18	2009/05/09 7:32	J2-416	
DVD-018-SC-A	2009/05/09 6:18	2009/05/09 7:32	J2-416	
DVD-019-BC-A	2009/05/09 11:00	2009/05/09 13:00	J2-416	***Large patch of tubeworms***
DVD-019-PC-A	2009/05/09 11:00	2009/05/09 13:00	J2-416	***sulfide chimneys***
DVD-019-SC-A	2009/05/09 11:00	2009/05/09 13:00	J2-416	
DVD-020-BC-A	2009/05/09 12:58	2009/05/09 14:58	J2-416	
DVD-020-PC-A	2009/05/09 12:58	2009/05/09 14:58	J2-416	
DVD-020-SC-A	2009/05/09 13:05	2009/05/09 14:58	J2-416	
DVD-021-BC-A	2009/05/09 14:56	2009/05/09 16:56	J2-416	
DVD-021-PC-A	2009/05/09 14:56	2009/05/09 16:56	J2-416	
DVD-021-SC-A	2009/05/09 14:56	2009/05/09 16:56	J2-416	
DVD-022-BC-A	2009/05/09 16:55	2009/05/09 18:11	J2-416	
DVD-022-PC-A	2009/05/09 16:55	2009/05/09 18:11	J2-416	
DVD-022-SC-A	2009/05/09 16:55	2009/05/09 18:11	J2-416	
DVD-023-BC-A	2009/05/10 5:58	2009/05/10 7:58	J2-417	
DVD-023-PC-A	2009/05/10 5:58	2009/05/10 7:58	J2-417	

DVD_Id	Start Date/Time	End Date/Time	Lowering	Comments
DVD-023-SC-A	2009/05/10 5:58	2009/05/10 7:58	J2-417	
DVD-024-BC-A	2009/05/10 7:54	2009/05/10 9:54	J2-417	
DVD-024-PC-A	2009/05/10 7:54	2009/05/10 9:54	J2-417	
DVD-024-SC-A	2009/05/10 7:54	2009/05/10 9:54	J2-417	
DVD-025-BC-A	2009/05/10 9:50	2009/05/10 11:52	J2-417	
DVD-025-PC-A	2009/05/10 9:50	2009/05/10 11:52	J2-417	
DVD-025-SC-A	2009/05/10 9:50	2009/05/10 11:52	J2-417	
DVD-026-BC-A	2009/05/10 11:48	2009/05/10 13:49	J2-417	
DVD-026-PC-A	2009/05/10 11:48	2009/05/10 13:49	J2-417	
DVD-026-SC-A	2009/05/10 11:48	2009/05/10 13:49	J2-417	
DVD-027-BC-A	2009/05/10 13:48	2009/05/10 15:48	J2-417	
DVD-027-PC-A	2009/05/10 13:48	2009/05/10 15:48	J2-417	
DVD-027-SC-A	2009/05/10 13:48	2009/05/10 15:48	J2-417	
DVD-028-BC-A	2009/05/10 15:46	2009/05/10 17:42	J2-417	
DVD-028-PC-A	2009/05/10 15:46	2009/05/10 17:42	J2-417	
DVD-028-SC-A	2009/05/10 15:46	2009/05/10 17:42	J2-417	
DVD-029-BC-A	2009/05/10 17:39	2009/05/10 18:02	J2-417	
DVD-029-PC-A	2009/05/10 17:39	2009/05/10 18:02	J2-417	
DVD-029-SC-A	2009/05/10 17:39	2009/05/10 18:02	J2-417	
DVD-030-BC-A	2009/05/11 4:58	2009/05/11 6:58	J2-418	
DVD-030-PC-A	2009/05/11 4:58	2009/05/11 6:58	J2-418	
DVD-030-SC-A	2009/05/11 4:58	2009/05/11 6:58	J2-418	
DVD-031-BC-A	2009/05/11 6:55	2009/05/11 8:55	J2-418	
DVD-031-PC-A	2009/05/11 6:55	2009/05/11 8:55	J2-418	
DVD-031-SC-A	2009/05/11 6:55	2009/05/11 8:55	J2-418	
DVD-032-BC-A	2009/05/11 8:52	2009/05/11 10:52	J2-418	
DVD-032-PC-A	2009/05/11 8:52	2009/05/11 10:52	J2-418	
DVD-032-SC-A	2009/05/11 8:52	2009/05/11 10:52	J2-418	
DVD-033-BC-A	2009/05/11 10:50	2009/05/11 12:49	J2-418	
DVD-033-PC-A	2009/05/11 10:50	2009/05/11 12:49	J2-418	
DVD-033-SC-A	2009/05/11 10:50	2009/05/11 12:49	J2-418	
DVD-034-BC-A	2009/05/11 12:47	2009/05/11 14:47	J2-418	
DVD-034-PC-A	2009/05/11 12:47	2009/05/11 14:47	J2-418	
DVD-034-SC-A	2009/05/11 12:47	2009/05/11 14:47	J2-418	
DVD-035-BC-A	2009/05/11 14:45	2009/05/11 16:45	J2-418	
DVD-035-PC-A	2009/05/11 14:45	2009/05/11 16:45	J2-418	
DVD-035-SC-A	2009/05/11 14:45	2009/05/11 16:45	J2-418	
DVD-036-BC-A	2009/05/11 16:42	2009/05/11 18:08	J2-418	
DVD-036-PC-A	2009/05/11 16:42	2009/05/11 18:08	J2-418	
DVD-036-SC-A	2009/05/11 16:42	2009/05/11 18:08	J2-418	
DVD-037-BC-A	2009/05/12 10:45	2009/05/12 12:45	J2-420	
DVD-037-PC-A	2009/05/12 10:45	2009/05/12 12:45	J2-420	
DVD-037-SC-A	2009/05/12 10:45	2009/05/12 12:45	J2-420	***NOT WORKING***
DVD-038-BC-A	2009/05/12 12:44	2009/05/12 14:43	J2-420	
DVD-038-PC-A	2009/05/12 12:44	2009/05/12 14:43	J2-420	
DVD-038-SC-A	NOT WORKING	NOT WORKING	J2-420	***NOT WORKING***
DVD-039-BC-A	2009/05/12 14:41	2009/05/12 16:41	J2-420	
DVD-039-PC-A	2009/05/12 14:41	2009/05/12 16:41	J2-420	

DVD_Id	Start Date/Time	End Date/Time	Lowering	Comments
DVD-039-SC-A	NOT WORKING	NOT WORKING	J2-420	***NOT WORKING***
DVD-040-BC-A	2009/05/12 16:39	2009/05/12 18:40	J2-420	
DVD-040-PC-A	2009/05/12 16:39	2009/05/12 18:40	J2-420	
DVD-040-SC-A	NOT WORKING	NOT WORKING	J2-420	***NOT WORKING***
DVD-041-BC-A	2009/05/12 18:38	2009/05/12 20:38	J2-420	***Missed ~.5 hours with dvcam***
DVD-041-PC-A	2009/05/12 18:38	2009/05/12 20:38	J2-420	
DVD-041-MC-A	Medea 20:03	2009/05/12 20:38	J2-420	
DVD-042-BC-A	2009/05/12 20:35	2009/05/12 22:35	J2-420	
DVD-042-PC-A	2009/05/12 20:35	2009/05/12 22:35	J2-420	
DVD-042-MC-A	2009/05/12 20:35	2009/05/12 22:35	J2-420	***recorded Medea Cam***
DVD-043-BC-A	2009/05/12 22:33	2009/05/13 0:06	J2-420	
DVD-043-PC-A	2009/05/12 22:33	2009/05/13 0:06	J2-420	
DVD-043-MC-A	2009/05/12 22:33	2009/05/13 0:06	J2-420	***recorded Medea Cam***

APPENDIX

JASON-2 DIVE LOGS (NELRC – TN234)

Latitude and longitude (vvlat/vvlong) positions are Jason renavigated "renav" locations. Renav is merged Doppler (DVL) and Ultra Short Baseline (USBL) with obvious bad fixes deleted. All times are UTC, 11 hours ahead of Samoan local time. vvrec is the virtual van record number. The Jason virtual van URL is: http://4dgeo.whoi.edu/jason/

J2-413 Dive Log

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 14:56:48			20	24	1	2	JASON in water
5/6/2009 15:00:20			21	341	176	7	MEDEA in water
5/6/2009 15:01:32			22	340	197	35	Starting down
5/6/2009 15:04:20			23	331	200	98	Main goals; Dive at W Mata summit
5/6/2009 15:05:13			24	329	200	103	Tools; Multi-chamber suction sampler; Scoop bags; Gas tight "GTB #2"; Major sampler.
5/6/2009 15:06:05			25	331	199	139	Other tools (on all dives); 2 Niskin bottles (one manual one other); Jason temp probe; ORP sensor.
5/6/2009 15:10:37			26	330	119	287	Tasks; Climb to summit of volcano (points A to B); Explore crestline of summit (points B to C); Deploy hydrophone and marker if warranted.
5/6/2009 15:16:11			27	326	151	456	Waypoints; A=15.094180S 173.749884W depth=1288m; B=15.094910S 173.749156W depth=1219m; C=15.094544S 173.748482W depth=1190m
5/6/2009 15:21:39			28	321	152	611	Frame Grab
5/6/2009 15:52:33			29	329	134	1204	Removing weight.
5/6/2009 16:01:30			30	114	16	1273	Frame Grab
5/6/2009 16:01:49			31	114	10	1280	JASON on bottom
5/6/2009 16:02:08	-15.09428	-173.74994	33	115	9	1279	VIDEO Start recording HDCam
5/6/2009 16:03:56	-15.09426	-173.75002	34	107	7	1285	NAV Doppler reset
5/6/2009 16:05:19	-15.09428	-173.74994	36	100	5	1283	Broken pillows with alteration around rims
5/6/2009 16:06:31	-15.09426	-173.74987	38	100	3	1281	Jason heading is 100°.
5/6/2009 16:08:18	-15.09425	-173.74984	40	102	3	1281	Preparing to pick up a rock sample.
5/6/2009 16:09:04	-15.09424	-173.74984	41	102	3	1281	TN_234 SAMPLE Geology 1. **J413-rock-01**. Picking up a hollow pillow fragment sample. **[Jason target info: J413-rock-01. 15.094232S / 173.749860W. Z=1282.] NW Flank area.**
5/6/2009 16:13:33	-15.09423	-173.74986	45	100	4	1279	TN_234 J413-rock-01 cont. At site of first contact with bottom.
5/6/2009 16:14:26	-15.09425	-173.74986	47	111	4	1279	Bottom covered with pillow fragments. All debris with light covering of fine black sand.
5/6/2009 16:15:10	-15.09428	-173.74985	49	124	6	1277	TN_234 J413-rock-01 cont. Sample was placed in GeoBox #3.
5/6/2009 16:15:41	-15.09431	-173.74982	50	125	6	1274	Jason heading is 122. Moving upslope along trackline to WP B.
5/6/2009 16:16:44	-15.09438	-173.74981	52	132	6	1272	Sand is increasing.
5/6/2009 16:17:43	-15.09443	-173.74978	54	133	6	1268	Fish in view
5/6/2009 16:18:16	-15.09445	-173.74978	56	131	4	1269	Lava flow. Pillows with shiny glass surface. Broken in places.
5/6/2009 16:19:06	-15.09447	-173.74978	58	132	7	1266	Pyroclastics on top of pillow lobes.
5/6/2009 16:20:46	-15.09449	-173.74975	60	139	8	1259	Some patches where sand is dominant otherwise broken pillows.
5/6/2009 16:21:31	-15.09449	-173.74973	62	136	5	1259	Some pillows have very fluid-looking appearance.
5/6/2009 16:22:23	-15.09448	-173.74973	64	140	4	1259	Some flatter-looking pillows. Almost sheet-flow in nature. Or perhaps stretched as extruded.
5/6/2009 16:23:46	-15.09448	-173.74974	66	143	2	1260	Trying to flip over a large sheet.
5/6/2009 16:24:31	-15.09447	-173.74971	68	142	6	1258	Rock too big to lift.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 16:25:14	-15.09451	-173.74968	70	142	4	1255	Jason heading is 143.
5/6/2009 16:26:05	-15.09451	-173.74964	72	145	5	1255	Sandy patches amongst broken pillows. Some pillows are quite flattened.
5/6/2009 16:29:18	-15.09457	-173.74954	76	165	4	1247	Broken edges of pillows all appear altered.
5/6/2009 16:29:25	-15.09457	-173.74954	77	165	4	1247	Ropey sheet flow.
5/6/2009 16:29:55	-15.09457	-173.74953	79	146	5	1245	Large outcrop of ropey sheet flow.
5/6/2009 16:31:28	-15.09457	-173.74951	81	177	4	1245	Positioning to break off piece of this flow.
5/6/2009 16:36:17	-15.09457	-173.74952	87	177	3	1246	SAMPLE Geology 2. **J413-rock-02**. Breaking off piece of ropey sheet flow. Placed in GeoBox#1. **[Jason target info: J413-rock-02. 15.094578S / 173.749518W. Z=1247.] NW Flank area.**
5/6/2009 16:37:17	-15.09457	-173.74952	89	177	3	1246	TN_234 J413-rock-02 cont. Same sample but taking multiple pieces. All breaking off the same ledge of ropey sheet flow.
5/6/2009 16:40:32	-15.09458	-173.74952	94	177	3	1246	J413-rock-02 cont. Rock crumbles easily as Jason arm tries to take samples. Pieces are probably breaking up further as placed in box.
5/6/2009 16:40:54	-15.09458	-173.74952	96	178	3	1246	J413-rock-02 cont. All pieces in GeoBox#1 are from same sample.
5/6/2009 16:43:01	-15.09459	-173.74952	99	177	3	1246	Vehicle is locked. Panning HDVideo to get good images of area sampled.
5/6/2009 16:44:32	-15.09459	-173.74951	101	135	7	1243	White staining around all edges of broken pillows is quite prominent.
5/6/2009 16:45:22	-15.09463	-173.74950	103	138	5	1239	Jason heading is 137. Moving along trackline again.
5/6/2009 16:46:55	-15.09457	-173.74939	106	151	5	1234	Smoke visible. Plume or did Jason stir it up?
5/6/2009 16:48:17	-15.09465	-173.74937	108	156	6	1226	Visibility overall has decreased
5/6/2009 16:49:11	-15.09475	-173.74936	110	157	7	1222	Smoke increasing. Probably plume.
5/6/2009 16:50:14	-15.09479	-173.74930	112	119	8	1217	Tubular pillows. Lots of staining in parts.
5/6/2009 16:50:20	-15.09480	-173.74930	113	119	8	1216	Big pile of pillows.
5/6/2009 16:51:01	-15.09481	-173.74929	115	120	8	1213	Large tubes and lobes.
5/6/2009 16:51:30	-15.09482	-173.74928	116	118	4	1211	Pillows in big pile mostly not broken.
5/6/2009 16:52:26	-15.09483	-173.74928	118	152	9	1206	Pillow pile has distinct margin and now into broken pillows with staining and alteration around edges and in spaces.
5/6/2009 16:52:41	-15.09484	-173.74927	119	153	10	1205	Black sand sitting on top of altered pillows.
5/6/2009 16:54:56	-15.09484	-173.74924	123	130	4	1204	Pillows here are mostly stained. Possibly iron. Pillows are covered with black sand.
5/6/2009 16:57:14	-15.09484	-173.74924	126	130	4	1204	Anemone or sponge.
5/6/2009 16:58:23	-15.09484	-173.74924	128	159	7	1202	Fluid flow is present.
5/6/2009 16:59:07	-15.09484	-173.74923	130	160	5	1203	Live shrimp.
5/6/2009 16:59:42	-15.09484	-173.74922	131	160	5	1203	Taking temperature probe out.
5/6/2009 17:01:00	-15.09484	-173.74921	134	158	5	1203	Ambient temp = 3.8
5/6/2009 17:01:56	-15.09484	-173.74920	136	159	6	1203	Weak fluid flow temp=8.7
5/6/2009 17:02:24	-15.09484	-173.74920	137	159	6	1203	Sticking probe in crack between pillows.
5/6/2009 17:03:41	-15.09484	-173.74921	139	159	6	1203	Reinserted probe and temp=8.7 again. Pretty consistent value.
5/6/2009 17:04:50	-15.09484	-173.74922	142	159	9	1201	Nav noted position as "Weak Fluid Flow" **[Jason target info: Weak Fluid Flow. 15.094814S 173.749280W. Z=1205.]**
5/6/2009 17:05:46	-15.09486	-173.74919	143	116	5	1198	Lots of staining around pillows.
5/6/2009 17:05:55	-15.09487	-173.74919	145	115	4	1198	Moving upslope again.
5/6/2009 17:06:04	-15.09487	-173.74918	146	111	4	1198	Jason heading is 111
5/6/2009 17:06:22	-15.09486	-173.74915	147	110	3	1198	Collapsed pillow in view.
5/6/2009 17:08:28	-15.09489	-173.74912	150	134	1	1200	SAMPLE Geology 3. **J413-rock-03**. Breaking off piece of pillow at edge of collapse. **NW Flank area.**
5/6/2009 17:09:17	-15.09489	-173.74912	152	133	196	1200	J413-rock-03 cont. Placing sample in GeoBox#1.
5/6/2009 17:09:42	-15.09489	-173.74912	153	134	1	1200	NAV Doppler reset
5/6/2009 17:10:47	-15.09482	-173.74912	155	66	6	1197	**Big vent in view!**
5/6/2009 17:11:08	-15.09477	-173.74915	157	90	11	1199	Billowing plume rising vigorously.
5/6/2009 17:11:35	-15.09471	-173.74915	158	153	17	1201	Woo Hoo! Super-Rota

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 17:11:55	-15.09468	-173.74913	160	164	11	1205	Flashes visible and explosion.
5/6/2009 17:12:22	-15.09468	-173.74913	161	165	10	1207	You should hear the racket in the van.
5/6/2009 17:12:45	-15.09467	-173.74913	162	165	10	1207	Tephra chunks blowing up out of vent within plume.
5/6/2009 17:13:03	-15.09467	-173.74913	164	165	10	1207	Red flashes extended.
5/6/2009 17:13:58	-15.09466	-173.74912	166	150	10	1207	Flashes all around rim of vent
5/6/2009 17:14:22	-15.09466	-173.74912	167	150	10	1207	Fissure just opened up and pillow actively extruding
5/6/2009 17:14:40	-15.09466	-173.74912	168	150	10	1207	Bob says "This is Super Rota Dave"
5/6/2009 17:15:52	-15.09468	-173.74912	171	150	10	1207	Extrusive lavas and explosions all at the same time.
5/6/2009 17:16:13	-15.09469	-173.74912	172	150	10	1207	Tephra raining out of plume
5/6/2009 17:16:55	-15.09469	-173.74912	174	150	10	1207	Bursts of vigorous plume explosions with tephra in plume ad red flashes at base.
5/6/2009 17:17:24	-15.09470	-173.74912	175	149	10	1207	Removing weights from basket
5/6/2009 17:18:10	-15.09470	-173.74911	177	150	10	1207	Flashes along fissure
5/6/2009 17:19:11	-15.09470	-173.74911	179	150	10	1206	Can see rocks around vent heave before fissure opens with red-rock flashes and gas and plume billowing out.
5/6/2009 17:19:21	-15.09470	-173.74911	180	150	10	1207	Then rocks collapse back into themselves after burst.
5/6/2009 17:20:18	-15.09470	-173.74911	182	150	10	1206	Bursts open pillow every 30-40 seconds or less and last for 10-20 seconds at a time.
5/6/2009 17:22:07	-15.09470	-173.74912	185	150	10	1206	Big lump of rim just pushed off from heave within vent and rolled down off edge.
5/6/2009 17:23:37	-15.09470	-173.74912	187	150	10	1207	Explosions with vigorous plume billowing out and tephra falling out of plume at same time pillow opens to see red flashes.
5/6/2009 17:25:07	-15.09470	-173.74912	190	150	9	1207	Fist-sized pieces falling out of plume are flat-ish and fall to seafloor.
5/6/2009 17:25:45	-15.09470	-173.74912	191	150	9	1207	Labeled on Nav as **"Eruption". [Jason target info: Vent eventually named Hades. 15.094707S 173.749115W Z=1208.]**
5/6/2009 17:26:40	-15.09470	-173.74912	193	150	9	1207	Sustained flashes again.
5/6/2009 17:28:13	-15.09470	-173.74912	196	135	10	1207	Fine particulates in water around vent appear very shiny when light hits them just right.
5/6/2009 17:28:52	-15.09470	-173.74912	198	135	10	1207	Vent appears aligned along a fissure about 4-5 meters long
5/6/2009 17:29:58	-15.09470	-173.74912	200	135	10	1207	Sustained red-flash extrusion with explosive component and large chunks of lava being sent high above vent.
5/6/2009 17:30:26	-15.09470	-173.74912	201	135	9	1207	Red flashes far more continuous and sustained than Rota
5/6/2009 17:31:01	-15.09470	-173.74912	203	135	9	1207	Jason depth is 1208m. Altitude is 10 meters above bottom.
5/6/2009 17:33:28	-15.09469	-173.74911	206	135	9	1208	Red hot lava beneath outer cooled pile. Pile expands to pushing outer rocks away.
5/6/2009 17:33:52	-15.09469	-173.74911	208	135	9	1208	Lots of downslope motion as pile around vent heaves.
5/6/2009 17:34:16	-15.09469	-173.74911	209	135	9	1208	Much more active then we have ever seen Rota. Pyroclastics of all sizes around vent.
5/6/2009 17:34:34	-15.09469	-173.74911	210	135	9	1208	Lots of degassing but no visible bubbles.
5/6/2009 17:37:55	-15.09476	-173.74909	215	81	6	1207	Big chunk just fell off edge and rolled downslope dragging other material with it.
5/6/2009 17:38:28	-15.09477	-173.74909	216	82	5	1207	taking rock off edge of rim around plume. Very crumbly. Stuff breaking off all the time.
5/6/2009 17:39:04	-15.09477	-173.74908	218	81	5	1207	Rock is glassy crunchy and very crumbly.
5/6/2009 17:41:53	-15.09475	-173.74910	222	77	4	1208	SAMPLE Geology 4. **J413-rock-04**. Trying to pick up rock along edge of erupting vent. Rock is very crumbly and hard to get without breaking up. **Hades.**
5/6/2009 17:42:24	-15.09475	-173.74910	223	77	4	1208	J413-rock-04 cont. Placed rock in GeoBox#4
5/6/2009 17:43:45	-15.09475	-173.74910	225	77	4	1208	J413-rock-04 cont. Multiple pieces all going into GeoBox#4
5/6/2009 17:45:57	-15.09475	-173.74909	229	76	4	1208	J413-rock-04 cont. Taking several pieces of same material for this sample. All going into GeoBox#4
5/6/2009 17:49:30	-15.09474	-173.74910	233	81	6	1207	Jason backed away from side and vent is still erupting vigorously.
5/6/2009 17:50:14	-15.09476	-173.74910	235	110	9	1204	Tephra falling out of plume
5/6/2009 17:50:38	-15.09480	-173.74908	236	143	8	1202	Now going to move away from vent to find place for hydrophone.
5/6/2009 17:51:56	-15.09485	-173.74902	239	113	4	1195	Plume
5/6/2009 17:53:10	-15.09483	-173.74902	241	119	7	1193	Visibility is zero. In plume. 1194m
5/6/2009 17:54:21	-15.09481	-173.74905	243	140	6	1199	Jason is at 1200m and tephra in plume is flying by

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 17:55:35	-15.09479	-173.74907	245	155	6	1199	Trying to find a spot to take a scoop sample.
5/6/2009 17:56:46	-15.09476	-173.74910	247	154	7	1199	"Drippy Stuff" in underside of ledges
5/6/2009 17:59:49	-15.09477	-173.74910	252	154	7	1199	Setting up to take scoop sample about 20m distant from vent and about 8 meters shallower.
5/6/2009 18:01:01	-15.09478	-173.74906	254	101	18	1190	SAMPLE Geology 5. **J413-sed-05**. Plume enveloping sub and sampler. **[Jason target info: J413-scoop. 15.094798S 173.748983W. Z=1194.] 20m S of Hades.**
5/6/2009 18:01:10	-15.09478	-173.74905	255	102	19	1189	NAV Doppler reset
5/6/2009 18:02:04	-15.09480	-173.74898	257	109	11	1187	J413-sed-05 cont. Thick yellow plume has enveloped sub. Starting to dissipate. Pausing sampling
5/6/2009 18:02:41	-15.09481	-173.74894	258	112	3	1193	J413-sed-05 cont. Now have clear view to take scoop.
5/6/2009 18:03:28	-15.09481	-173.74893	260	110	2	1193	J413-sed-05 cont. Taking scoop.
5/6/2009 18:05:43	-15.09479	-173.74894	263	109	2	1194	SAMPLE J413-sed-05 cont. Placing scoop bag behind Stbd milk crate.
5/6/2009 18:09:36	-15.09479	-173.74888	268	111	4	1190	We're sitting at the site. The vent is at 1208m. right now we're about 20m distant upslope of the vent.
5/6/2009 18:11:50	-15.09478	-173.74888	272	111	4	1189	A big pile of pyroclastics covering the slope.
5/6/2009 18:12:53	-15.09478	-173.74889	274	111	4	1190	We're going to take a temp probe in this big pile of pyroclastics here.
5/6/2009 18:13:27	-15.09478	-173.74889	275	111	4	1190	The temp in the sands here about 30cm is rising. 8C - about 4.5 degrees above ambient.
5/6/2009 18:13:39	-15.09478	-173.74889	276	111	4	1189	VIDEO Stop recording HDCam about 5 min ago.
5/6/2009 18:14:16	-15.09478	-173.74889	278	111	4	1189	The temp in the sand here is about 6 degrees above ambient.
5/6/2009 18:14:41	-15.09478	-173.74890	279	111	4	1189	Ambient is about 3.8 here. The whole top is leaking warm water.
5/6/2009 18:15:01	-15.09479	-173.74890	281	111	4	1189	We're only about 25m from the vent.
5/6/2009 18:15:23	-15.09479	-173.74890	282	111	4	1189	Target is called active eruption.
5/6/2009 18:16:02	-15.09479	-173.74889	284	111	5	1189	Shrimp here. 1 here.
5/6/2009 18:16:33	-15.09478	-173.74886	285	99	5	1187	We're at the summit here. 1188m.
5/6/2009 18:17:24	-15.09480	-173.74883	287	146	1	1187	We're looking for a place to deploy the hydrophone. There could be an outcrop here. It's pretty small.
5/6/2009 18:18:30	-15.09477	-173.74885	289	57	5	1186	We're at a crest here - not sure if it is the summit. Looks like could be sulfur there on the rocks.
5/6/2009 18:18:47	-15.09474	-173.74883	290	57	3	1187	We're heading NE now along this small summit ridge.
5/6/2009 18:19:53	-15.09470	-173.74881	293	66	5	1188	Could be white mat of chemical precipitate covering the ridge here. White coating.
5/6/2009 18:20:21	-15.09468	-173.74880	294	74	6	1188	VIDEO Start recording HDCam
5/6/2009 18:21:03	-15.09466	-173.74878	296	98	5	1188	Traveling along the ridge crest.
5/6/2009 18:21:23	-15.09465	-173.74876	297	104	4	1188	Looks like shimmer in the HDCam but it's probably the monitor.
5/6/2009 18:23:10	-15.09466	-173.74876	300	107	4	1188	There's a little orange patch in the sci cam. Not sure what it is. Probably mat.
5/6/2009 18:23:21	-15.09466	-173.74876	301	107	4	1188	Taking a temp probe here.
5/6/2009 18:24:34	-15.09467	-173.74877	303	107	4	1187	This is hotter than the other spot. Ambient is 3.8deg. Temp is 19.8 now.
5/6/2009 18:24:59	-15.09467	-173.74877	305	108	4	1188	Temp is 17 degrees above ambient.
5/6/2009 18:26:44	-15.09466	-173.74877	308	107	4	1187	Temp in seds is over 23 degrees.
5/6/2009 18:27:40	-15.09466	-173.74876	310	107	4	1187	Temp got up to 23.4C here in the seds at the top.
5/6/2009 18:27:55	-15.09466	-173.74876	312	107	4	1188	There is some type of precipitate here forming at the interface.
5/6/2009 18:28:43	-15.09465	-173.74876	313	107	4	1188	We're going to suction sample the sediments here.
5/6/2009 18:31:46	-15.09465	-173.74875	317	107	4	1187	SAMPLE BIOLOGY 6. Suction sample the seds at the summit here. **J413-mat-06**. Looks like altered pyroclastics and microbial mat. **Summit.**
5/6/2009 18:33:21	-15.09466	-173.74876	320	107	4	1187	J413-mat-06 cont. Going into the red sample container. Z=1187.
5/6/2009 18:34:37	-15.09466	-173.74876	322	107	4	1187	J413-mat-06 cont. Trying to get the orange stuff. Could be altered minerals. Going into the red container.
5/6/2009 18:36:55	-15.09466	-173.74876	326	107	4	1187	J413-mat-06 cont. More would be good. The consensus is that the white seds are full of microbes. Could be a bit of both.
5/6/2009 18:37:34	-15.09466	-173.74877	327	107	4	1187	Changing watch right now. Jim Varnum is here now. Will is leaving.
5/6/2009 18:38:02	-15.09466	-173.74877	329	107	4	1187	Susan Merle took over logging at 7am local. Akel is taking over the navigation.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 18:39:39	-15.09466	-173.74876	331	97	3	1187	J413-mat-06 cont.. Still slurping. Going for the red splotches. Repositioning to get the red material.
5/6/2009 18:41:16	-15.09466	-173.74876	334	98	3	1187	J413-mat-06 cont. We're E/NE of vent. To the vent is about 260degrees. Z=1187. Multibeam depth for summit is 1175m.
5/6/2009 18:43:05	-15.09466	-173.74875	337	98	4	1187	J413-mat-06 cont. Sample stop. Lots of material in the sampler.
5/6/2009 18:44:55	-15.09465	-173.74875	340	98	4	1187	J413-mat-06 cont. 15 5.678 173 44.925 USBL position for sample 6. Finished with sample and stowing the hose.
5/6/2009 18:46:04	-15.09465	-173.74875	342	98	4	1187	VIDEO Stop recording HDCam about 10 minutes ago.
5/6/2009 18:46:47	-15.09466	-173.74875	343	98	4	1187	Want to find a place to deploy the hydrophone.
5/6/2009 18:46:53	-15.09466	-173.74875	345	98	4	1187	VIDEO Start recording HDCam
5/6/2009 18:48:47	-15.09466	-173.74876	347	99	3	1187	Dave Clague is taking over for Bob Embley for breakfast break.
5/6/2009 18:50:09	-15.09466	-173.74876	350	101	4	1187	Will continue up this ridge to the NE. Looking for a solid outcrop to place the hydrophone.
5/6/2009 18:51:11	-15.09465	-173.74871	352	62	2	1186	Moving again. Heading about 54degrees. Course is 064.
5/6/2009 18:52:03	-15.09462	-173.74868	354	61	2	1185	The speckled stuff here is probably sulfur pieces. The amount of white seds? has decreased and seeing more big chunks.
5/6/2009 18:52:53	-15.09460	-173.74865	356	62	2	1184	Zooming in on the little specks on the seafloor. Could be sulfur or iron-oxide stuff. Could be a bit of bio also.
5/6/2009 18:54:01	-15.09459	-173.74860	358	62	3	1180	Visually it looks like black seds with rocks outcropping. They are probably oxidized here.
5/6/2009 18:55:01	-15.09460	-173.74861	360	53	3	1181	We see shimmering water here and bacterial mat on these rocks.
5/6/2009 18:57:20	-15.09461	-173.74862	363	42	4	1180	Bacterial mat on these rocks here. Calling it **Red Rock Ridge**. There is bacterial mat here and obvious shimmer.
5/6/2009 19:00:23	-15.09461	-173.74861	367	41	4	1180	**[Jason target info: Red Rock Ridge. 15.094602S 173.748589W. Z=1182.]** Are going to take a temp here first then probably a suction. Z=1180. Temp is going up here in this shimmer area.
5/6/2009 19:01:52	-15.09461	-173.74860	370	42	4	1180	Red Rock Ridge. Taking temp in this rock outcrop where water is shimmering.
5/6/2009 19:03:15	-15.09461	-173.74860	372	42	4	1180	Jimmy poked the probe in the rock. Lots of floc pouring out of the rock crevice.
5/6/2009 19:05:48	-15.09461	-173.74860	375	41	4	1180	Temp got up to 25deg. Eruptive site is 268degrees. 58m. We're to the NE of the eruptive site.
5/6/2009 19:07:34	-15.09461	-173.74861	378	41	4	1180	SAMPLE Biology 7. Suction for bacterial mat. **J413-mat-07**. **Red Rock Ridge**. Z=1180m. Blue suction sampler.
5/6/2009 19:10:35	-15.09460	-173.74861	382	41	4	1180	J413-mat-07 cont. Temp here was 25 degrees. White filamentous bacteria. PI Davis.
5/6/2009 19:12:36	-15.09460	-173.74861	385	42	4	1180	J413-mat-07 cont. Finished sampling the bacterial mat on this outcrop.
5/6/2009 19:13:08	-15.09460	-173.74861	387	41	4	1180	We are dubbing the active eruptive vent site Hades.
5/6/2009 19:14:42	-15.09461	-173.74860	389	42	4	1180	Flushing the suction sampler.
5/6/2009 19:15:41	-15.09461	-173.74860	391	41	4	1180	Stowing the suction sampler now.
5/6/2009 19:16:46	-15.09461	-173.74861	393	42	4	1180	J413-mat-07 finished. Was the blue suction sampler.
5/6/2009 19:18:40	-15.09463	-173.74859	396	7	6	1178	Backing out and looking around for a place to deploy the hydrophone. Circling around.
5/6/2009 19:20:09	-15.09463	-173.74858	399	353	6	1178	Broken pillow at top of ridge.
5/6/2009 19:22:05	-15.09461	-173.74852	402	357	6	1177	Maneuvering around here. Plan to continue along the ridge looking for a place to deploy the hydrophone.
5/6/2009 19:23:50	-15.09457	-173.74844	404	42	4	1174	Looks like plumage coming right out of the seds here. The whole top is probably permeable.
5/6/2009 19:24:51	-15.09456	-173.74840	407	42	5	1170	Lots of outcrop here. Orange staining on the rocks.
5/6/2009 19:26:15	-15.09455	-173.74836	409	57	2	1167	It's getting murky here. Lots of plumage coming out of the seds here. Debating whether or not there is another vent here.
5/6/2009 19:26:49	-15.09454	-173.74834	410	56	2	1167	Seeing lots of bacterial mat on the rocks here.
5/6/2009 19:27:25	-15.09453	-173.74835	412	30	2	1167	The navigation is really good according to Akel. Lots more bacterial mat here.
5/6/2009 19:28:58	-15.09453	-173.74835	415	6	3	1167	We are going to stop here and sample the bacterial mat.
5/6/2009 19:30:48	-15.09454	-173.74834	417	9	3	1167	Will take the temp here.
5/6/2009 19:31:09	-15.09454	-173.74834	419	10	3	1167	Will first suck up the bacterial mat and then take a temperature probe.
5/6/2009 19:33:39	-15.09454	-173.74834	422	9	3	1167	SAMPLE Biology 8. **J413-mat-08**. Suctioning bacterial mat on this outcrop. Mat is white and filamentous. There is also orange staining here. Z=1167. **White Mat Vent.**

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 19:34:39	-15.09455	-173.74834	424	9	3	1167	J413-mat-08 cont. Green suction bottle. Still sampling.
5/6/2009 19:37:46	-15.09454	-173.74835	428	9	3	1168	J413-mat-08 cont. Finished slurping. Temp probe now. White mat vent is the name of this area.
5/6/2009 19:40:26	-15.09455	-173.74835	432	9	3	1168	J413-mat-08 area. 15 5.673 173 44.901. z=1168. White Mat Vent. Temp got up to 21.3C.
5/6/2009 19:41:14	-15.09455	-173.74834	434	10	3	1168	White Mat Vent area. Deploying a marker here in this area of outcrop and white bacterial mat.
5/6/2009 19:42:04	-15.09454	-173.74834	436	9	3	1168	**DEPLOY Marker 154 at White Mat Vent**. Place of sample 8. **[Jason target info: Mkr-154 White Mat Vent. 15.094538S 173.748350W. Z=1169.]**
5/6/2009 19:46:21	-15.09455	-173.74833	441	11	3	1167	We are close to the summit here - just to the SW of the summit. The USBL cluster is about 4 meters. Great looking nav.
5/6/2009 19:47:06	-15.09455	-173.74831	443	56	3	1166	Continuing along the ridge to the E/NE to the top of the volcano.
5/6/2009 19:49:44	-15.09443	-173.74822	446	9	2	1163	We are traveling along the ridge to the NE. It's getting hard to see. Doubtful to many that the plumage is just coming out of the sediments.
5/6/2009 19:50:33	-15.09437	-173.74824	448	10	4	1164	There is a plume right in front of us in Medea.
5/6/2009 19:52:20	-15.09433	-173.74835	451	78	8	1169	There is another vent in front of us we believe. Certainly see a plume.
5/6/2009 19:52:50	-15.09433	-173.74832	453	74	5	1170	**We're at the summit here**. There is an obvious plume here.
5/6/2009 19:53:16	-15.09431	-173.74834	454	73	5	1170	We have another vent here. We see pyroclastics coming out of the plume.
5/6/2009 19:54:30	-15.09431	-173.74829	456	100	6	1172	This vent is right at the summit. This is 100m NE of Hades. There is red in the HD.
5/6/2009 19:55:16	-15.09431	-173.74828	458	99	5	1173	This appears to be pyroclastic. We're right at the summit here. Ash is pouring out of here.
5/6/2009 19:57:28	-15.09431	-173.74827	461	99	6	1172	Z=1173m here. 15 5.658 173 44.896. We're at the summit. We're in a bit of a pit here.
5/6/2009 19:58:44	-15.09431	-173.74827	463	99	7	1172	**We're seeing tons of flame coming out of the vent (later named Prometheus).** Ash falling out of the plume. It looks like it is on fire. Small cone at the base of this plume with red rock.
5/6/2009 20:03:11	-15.09432	-173.74834	469	99	5	1175	This vent is pretty much along the ridge line from the last eruptive site.
5/6/2009 20:03:42	-15.09432	-173.74834	470	100	5	1175	We're backing away a bit because of an eruptive event. The vent is just ahead of us.
5/6/2009 20:03:55	-15.09432	-173.74834	472	99	5	1176	There are lots of shrimp on the rocks here.
5/6/2009 20:04:44	-15.09432	-173.74833	473	98	5	1176	We want to get water samples if we can; a scoop of sand; and some shrimp if we can.
5/6/2009 20:05:28	-15.09432	-173.74833	475	99	4	1176	There are a plethora of shrimp here.
5/6/2009 20:08:34	-15.09433	-173.74831	479	141	4	1177	We're dubbing the fiery vent **Prometheus**. We are now sitting about 6m to the SW of the eruptive vent.
5/6/2009 20:09:58	-15.09432	-173.74832	482	140	4	1178	SAMPLE Biology 9. **J413-shrimp-09**. Suctioning up shrimp here about 6m to the SW of the eruptive vent Prometheus. Z=1177. **[Jason target info: Shrimp. 15.094337S 173.748311W. Z=1176.] Prometheus Area.**
5/6/2009 20:11:25	-15.09432	-173.74832	484	144	5	1177	J413-shrimp-09 cont. Suction shrimp into the black suction chamber. There are lots of shrimp in the sampler. Jim says about 60 in there.
5/6/2009 20:13:34	-15.09434	-173.74832	487	166	3	1177	The rocks here are covered with shrimp.
5/6/2009 20:15:06	-15.09434	-173.74831	490	166	3	1177	There are possibly 2 species of shrimp here. Tim Shank thinks that they are probably 1 species.. Probably choracaris according to Tim. Observing them right now.
5/6/2009 20:16:25	-15.09433	-173.74832	492	164	3	1177	Finished sampling the shrimp and will now take a temp here.
5/6/2009 20:17:40	-15.09433	-173.74829	494	87	5	1174	We are going back to the plume (east of us). Want to get a scoop.
5/6/2009 20:19:09	-15.09433	-173.74827	497	87	4	1175	The major nozzle has a kink in it.
5/6/2009 20:21:57	-15.09433	-173.74825	502	87	2	1174	SAMPLE Fluid 10. **J413-major-10**. Fired major as close as could get to the plume. **Prometheus.**
5/6/2009 20:23:14	-15.09432	-173.74825	504	87	2	1174	j413-major-10. **[Jason target info: Prometheus. 15.094325S. 173.748263W. Z=1175.]**
5/6/2009 20:25:00	-15.09432	-173.74826	507	88	2	1174	Zoomed in right over the pit here at Prometheus. This looks a lot like Brimstone is 2006 but more vigorous.
5/6/2009 20:26:05	-15.09432	-173.74826	509	87	2	1174	SAMPLE Gas 11. Fired green gastight #2 right over **Prometheus**. **J413-gas-11**. Z=1174. 15 5.659 173 44.896.
5/6/2009 20:26:16	-15.09432	-173.74826	510	87	2	1174	***NAV Doppler reset***
5/6/2009 20:27:08	-15.09432	-173.74826	512	87	2	1174	Flames are pouring out of this orifice at Prometheus. Z=1174.
5/6/2009 20:28:11	-15.09432	-173.74826	514	88	2	1174	Doppler shift caused a 10m shift to the south.
5/6/2009 20:29:11	-15.09432	-173.74826	516	88	2	1174	Vehicle heading is 88 degrees. The fix that we just got is correct for Prometheus.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 20:30:42	-15.09432	-173.74826	518	87	2	1174	This vent is at the summit. This is more vigorous than Hades. This is a small lava fountain. All pyroclastic. This is the equivalent of a fountain in air. Hades was extruding a lot more lava.
5/6/2009 20:31:17	-15.09432	-173.74826	520	87	2	1174	Trying to take the temp here. Can't really get in it so are not seeing any change.
5/6/2009 20:31:29	-15.09432	-173.74826	521	86	2	1174	Prometheus looks like a small cone here.
5/6/2009 20:32:10	-15.09432	-173.74826	523	87	2	1174	Hades was more blocky lavas than Prometheus. Activity will change from day to day.
5/6/2009 20:33:33	-15.09432	-173.74826	525	88	2	1174	SAMPLE Geology 12. **J413-sed-12**. Scoop sample of the pyroclasts near the vent orifice. Z=1174. 15 5.659 173 44.896. **Prometheus.**
5/6/2009 20:36:26	-15.09432	-173.74826	529	88	2	1174	J413-sed-12 cont. Full bag of sediments. Probably some glass in there. Patched bag with black stitching and yellow tape on handle.
5/6/2009 20:40:16	-15.09430	-173.74837	534	124	9	1177	SAMPLE Geology 13. **J413-rock-13**. Large rock elongate about 9 inches long. Vesicular. Went into crate 8. **Prometheus.**
5/6/2009 20:41:01	-15.09431	-173.74837	536	129	11	1177	J413-rock-13 finished. Went into crate 8. 15 5.659 173 44.896.
5/6/2009 20:42:49	-15.09433	-173.74840	538	130	7	1172	We now want to go to the top of the ridge and follow it to the E/NE.
5/6/2009 20:44:58	-15.09440	-173.74838	542	171	7	1164	We plan to head up to the E/NE up to the top of the ridge.
5/6/2009 20:45:20	-15.09441	-173.74837	543	149	8	1164	Shimmering water and lots of mat everywhere. Big outcrop of bacterial mat here.
5/6/2009 20:46:32	-15.09447	-173.74828	545	137	3	1164	We're approaching the top of the ridge. Small patches of mat here but less than earlier.
5/6/2009 20:47:14	-15.09446	-173.74825	547	100	4	1163	We're pretty much at the summit here. Z=1164. Seeing shrimp at the summit here.
5/6/2009 20:48:48	-15.09443	-173.74816	549	75	2	1162	Probably still seeing the plume from Prometheus.
5/6/2009 20:49:29	-15.09439	-173.74811	551	75	3	1162	Probably multiple conduits from the same magma chamber.
5/6/2009 20:50:33	-15.09434	-173.74807	553	81	4	1162	Still searching for hydrophone deployment site. Huge pillows draping over the summit here. Orange and white staining.
5/6/2009 20:51:18	-15.09432	-173.74806	555	66	3	1162	Lots of shimmer here at the summit. We're at 1163 and climbing so still not at the top. Slight white coating of the volcaniclastics. Shrimp.
5/6/2009 20:52:51	-15.09428	-173.74803	557	37	3	1159	**Looks like the summit right now. Z=1158.**
5/6/2009 20:55:59	-15.09429	-173.74805	562	35	3	1158	Want to take a temp probe here at the summit sands. Ambient is about 3.8 degrees here. Here it's about 20C Z=1158.
5/6/2009 20:57:07	-15.09428	-173.74805	564	36	3	1158	Taking another temp here about 1 meter up from the last temp probe at the "tippy top". Temp is 18.6 here.
5/6/2009 20:57:40	-15.09428	-173.74804	565	36	3	1158	Lots of shrimp here in the area.
5/6/2009 20:58:39	-15.09428	-173.74804	567	35	3	1158	We're sitting here at the summit doing a bit of housekeeping with the basket.
5/6/2009 21:00:03	-15.09428	-173.74803	570	35	3	1158	**Both vents seem to be a little bit to the north of the ridge crest - just barely.**
5/6/2009 21:02:06	-15.09429	-173.74805	573	228	1	1158	Plan to drive parallel to the ridge crest - just to the north of it back toward Hades vent.
5/6/2009 21:03:37	-15.09427	-173.74814	575	260	5	1159	Goal number one is to find some hard rock near Hades to deploy the hydrophone.
5/6/2009 21:04:45	-15.09420	-173.74813	577	258	4	1159	We are now trying to get outside the Prometheus plume.
5/6/2009 21:05:24	-15.09417	-173.74809	579	258	5	1161	Prometheus was the first man to go and steal fire from the Greek gods and bring it back to mortal man.
5/6/2009 21:07:31	-15.09430	-173.74850	582	265	12	1165	We are heading 258 degrees. Moving along the north side of the summit.
5/6/2009 21:07:50	-15.09427	-173.74858	583	260	16	1167	Can't see the bottom. Our altitude is about 19m.
5/6/2009 21:11:38	-15.09420	-173.74869	588	260	11	1191	We're now off to the west of Prometheus. Our altitude is 10m.
5/6/2009 21:14:18	-15.09430	-173.74869	592	260	4	1192	The bottom is dropping out. We're about 100m from the target (which is northwest of Hades).
5/6/2009 21:14:49	-15.09431	-173.74870	593	259	4	1192	We're starting to see some pillows in the buttcam.
5/6/2009 21:17:17	-15.09439	-173.74884	597	260	4	1203	Exactly 1 hour ago we changed HD tapes.
5/6/2009 21:18:31	-15.09435	-173.74882	599	260	2	1208	We're seeing the bottom again. Driving to the S/SW. We're seeing another plume.
5/6/2009 21:19:54	-15.09432	-173.74891	602	257	2	1213	We're seeing a thick plume here again. Not sure if it is Prometheus or Hades - or yet another vent?? Z=1212.
5/6/2009 21:20:27	-15.09431	-173.74895	603	263	3	1214	We're getting USBL to both Medea and Jason.
5/6/2009 21:25:00	-15.09450	-173.74938	609	141	5	1236	Seeing bottom again. Brecciated material. Just N/NW of Hades about 10m. Fragmental material here probably produced as part of the eruption.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 21:27:12	-15.09455	-173.74940	612	158	5	1237	Looking around here for a place to put the hydrophone.
5/6/2009 21:28:25	-15.09456	-173.74941	614	157	4	1237	We're below the vent to the NW off to the north side of the ridge.
5/6/2009 21:29:44	-15.09460	-173.74940	616	137	4	1236	Looking at probably intact pillows that flowed downslope.
5/6/2009 21:30:04	-15.09461	-173.74939	618	137	4	1235	These look like a cross between pillows and lobates.
5/6/2009 21:31:14	-15.09465	-173.74936	621	136	4	1230	We are climbing up slope.
5/6/2009 21:32:34	-15.09468	-173.74931	623	136	4	1225	We're seeing red glowing stuff on the young glowing pillow.
5/6/2009 21:32:52	-15.09467	-173.74931	625	129	5	1225	**Oh my! It's a glowing pillow.**
5/6/2009 21:33:46	-15.09466	-173.74931	626	129	4	1225	This is amazing. Young glowing pillow lava right in front of us.
5/6/2009 21:35:23	-15.09464	-173.74932	629	129	5	1225	The crack is spreading out in this pillow lava. this is how it happens. It's an elongate pillow tube.
5/6/2009 21:36:09	-15.09464	-173.74932	631	130	4	1226	This is right down slope from Hades.
5/6/2009 21:37:30	-15.09465	-173.74930	633	125	2	1227	Flaming pillow over the top of older rock. Targeting this site as extruding pillow. **[Jason target info: Active pillow flow. 15.094683S 173.749266W. Z=1228.]**
5/6/2009 21:38:55	-15.09467	-173.74928	636	126	2	1227	SAMPLE Geology 14. **J413-rock-14**. Older rock loose in the debris. Probably older broken pillow. Pillow fragment with orange staining. About 10 inches long. Glassy rim. **Downslope from Hades.**
5/6/2009 21:42:01	-15.09466	-173.74929	640	123	4	1226	SAMPLE Geology 14 cont. J413-rock-14. Z=1227. 15 5.681. 173 44.956. Went into box. Hdg 123.
5/6/2009 21:42:42	-15.09466	-173.74930	641	124	4	1226	Plan to drop the weight on the forming lava tube to see what's inside. Lava we presume. It was red and glowing.
5/6/2009 21:44:06	-15.09467	-173.74930	644	129	3	1226	Lots of glass around the front of this.
5/6/2009 21:45:13	-15.09467	-173.74930	646	129	3	1226	Not able to break the crust of the pillow.
5/6/2009 21:46:35	-15.09468	-173.74929	648	129	5	1224	Target for this thing is "active pillow flow". Dropped the weight next to this pillow that was glowing earlier. Couldn't break it open with the weight.
5/6/2009 21:48:42	-15.09472	-173.74921	651	129	5	1217	Heading upslope now looking for an area to deploy the hydrophone.
5/6/2009 21:50:05	-15.09472	-173.74921	654	127	5	1214	We're approaching the vent. Black smoke is tumbling downslope.
5/6/2009 21:50:32	-15.09472	-173.74922	655	178	5	1214	Ash (tephra) in the plume.
5/6/2009 21:51:35	-15.09475	-173.74923	657	175	8	1209	Amazing pillow rinds in front of us.....
5/6/2009 21:52:44	-15.09481	-173.74918	659	160	6	1202	The vent is 10m NE of us. Seeing lots of outcrops; truncated pillows. coming up on altered stuff.
5/6/2009 21:53:05	-15.09484	-173.74917	661	154	7	1199	Looking at drip structures in these pillows here.
5/6/2009 21:53:54	-15.09488	-173.74916	663	154	1	1199	We're on the pillows here. We're close to the vent.
5/6/2009 21:54:16	-15.09490	-173.74915	664	138	1	1200	Can see the Hades plume in Medea.
5/6/2009 21:54:55	-15.09491	-173.74915	666	141	1	1200	We're only about 25m from Hades.
5/6/2009 21:56:07	-15.09489	-173.74914	668	100	1	1199	Plan to set the hydrophone down on one of these pillow lobes.
5/6/2009 21:56:40	-15.09489	-173.74914	669	100	1	1199	Preparing to deploy the hydrophone.
5/6/2009 21:59:28	-15.09487	-173.74914	673	100	1	1199	**DEPLOY Hydrophone** on this flat area between sediments. We're along the contour. Hades was at 1207m and we're at 1200m.
5/6/2009 22:00:06	-15.09487	-173.74914	675	100	1	1199	Hydrophone is sitting in the seds between pillows.
5/6/2009 22:01:26	-15.09488	-173.74913	677	100	1	1199	**DEPLOY Marker 147** next to the hydrophone near Hades. Marker 147 deployed above Hades.
5/6/2009 22:02:48	-15.09486	-173.74915	679	62	2	1199	Marker 147 and hydrophone. **[Jason target info: Mkr-147 Hydrophone deployed. 15.094873S 173.749133W. Z=1200.]**
5/6/2009 22:03:46	-15.09478	-173.74920	681	50	4	1203	**We're now heading up to Hades to observe it while the hydrophone is deployed.**
5/6/2009 22:04:12	-15.09476	-173.74920	683	49	5	1205	Saw a flash at the vent site and see 4 areas of glowing red which is probably advancing pillows.
5/6/2009 22:05:53	-15.09469	-173.74915	686	78	10	1205	Looking at the vent in front of us. Saw a red flash in the center. Glowing all around the base of it.
5/6/2009 22:06:19	-15.09469	-173.74915	687	80	12	1202	Red cracks along the edge of the pit.
5/6/2009 22:07:26	-15.09468	-173.74913	689	79	8	1207	Pillows cracks in the forming lava. Seeing bursts of lava at the center of the eruptive site.
5/6/2009 22:07:55	-15.09469	-173.74911	691	80	8	1207	Spatial scale between the explosive stuff and effusive stuff is small.
5/6/2009 22:09:23	-15.09471	-173.74909	693	97	6	1205	It's a big pile of lavas with big explosions of fire going on.
5/6/2009 22:10:21	-15.09471	-173.74909	695	99	7	1205	Really something to see. We're spellbound looking at the eruptive site. It's extruding pillows downslope. Hot magma at the surface.
5/6/2009 22:10:48	-15.09471	-173.74910	696	98	7	1206	This is the most active volcanic feature we've ever seen on the seafloor.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J413 log comments (West Mata)
5/6/2009 22:11:31	-15.09470	-173.74910	698	98	8	1205	There is goes again. Big pulses of extrusive activity.
5/6/2009 22:12:30	-15.09469	-173.74912	700	98	10	1205	Rocks cascading off of the eruptive vent. We are looking at pillows being fed from down below.
5/6/2009 22:13:09	-15.09468	-173.74912	702	98	9	1206	The vent is sort of being obscured by the plume. We are seeing things that no one has ever seen on the seafloor before. Actual pillow extrusion.
5/6/2009 22:14:40	-15.09464	-173.74912	704	97	12	1206	Now we're looking at the primary vent and pillows that are extruding out of the bottom of the vent. The stuff coming out of the top typically breaks up.
5/6/2009 22:15:04	-15.09465	-173.74910	706	98	9	1206	Here at Hades observing the active volcanism. What a sight.
5/6/2009 22:17:59	-15.09466	-173.74911	710	142	13	1205	We can fire the Niskins in the plume as we ascend. The pillow piece just fell off. Amazing.
5/6/2009 22:18:48	-15.09466	-173.74911	711	141	21	1206	Dropping the weights and preparing for the ROV ascent.
5/6/2009 22:19:44	-15.09466	-173.74911	713	141	29	1206	Hades exploding with a little bit of orange. Hades is mainly extrusive. Prometheus is more explosive - all pyroclastic. This is the story today. It could change tomorrow.
5/6/2009 22:21:46	-15.09466	-173.74911	714	138	33	1205	SAMPLE Fluid 15. **J413-niskin-15**. Right loop. Z=1205 Altitude of 30m. Port niskin. **Above Hades.**
5/6/2009 22:23:22	-15.09466	-173.74911	715	331	39	1199	SAMPLE Fluid 16. **J413-niskin-16**. Also in the plume **above Hades**. Z=1201. Altitude is 38m.
5/6/2009 22:27:29	-15.09466	-173.74911	716	2	63	1180	Heading up now.
5/6/2009 23:08:16							Medea at the surface.
5/6/2009 23:09:04							Just lost all vehicle power.
5/6/2009 23:10:23							Got some of the power back.
5/6/2009 23:10:40							Hydraulics brought back up.
5/6/2009 23:18:46							JASON on deck

J2-414 Dive Log

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 07:03:37			725	84	1	1	JASON in water
5/7/2009 07:03:46			726	105	1	2	Start of dive J2-414.
5/7/2009 07:04:44			727	69	193	12	Main Goals of dive J2-414; Explore crest of West Mata and sample fluids; biology; geology.
5/7/2009 07:05:16			728	68	187	12	Tasks; Begin dive SE of crest line along summit NE of Prometheus.
5/7/2009 07:05:44			729	68	199	7	Tasks cont. Climb slope and explore along crestline to position of Prometheus sampling fluids and biology.
5/7/2009 07:06:06			730	69	1	4	Medea in the water.
5/7/2009 07:06:27			731	73	178	2	Tasks cont. Revisit Prometheus to collect water; biology as indicated and make observations.
5/7/2009 07:06:44			732	73	1	2	Tasks cont. Revisit Hades area to collect water etc. and make observations.
5/7/2009 07:07:11			733	70	187	9	Tasks cont. Revisit hydrophone location to look at its condition and possibly retrieve (depends).
5/7/2009 07:08:19			734	69	121	38	Tools; Scoop bags (2); Gas tights (2); Single chamber suction sampler; Vent fluid sampler; Clague core box (4 cores); Davis scoops (2); Markers (2).
5/7/2009 07:09:58			735	68	199	52	Basket for this dive; Quad milk crates for rock samples; Bioboxes; 2 Gastights; 2 markers; 2 scoop bags; Clague Core box; Davis samplers.
5/7/2009 07:39:10			736	11	53	879	Frame Grab
5/7/2009 07:39:16			737	11	62	882	Frame Grab
5/7/2009 07:44:31			738	17	44	1026	Starting to see the plume here at 1025m.
5/7/2009 07:47:29			739	25	140	1107	The plume is really thick here at 1096m.
5/7/2009 07:55:01			740	31	105	1134	Dropping weights.
5/7/2009 07:55:14	-15.09547	-173.75094	741	32	104	1134	Still 100m off the bottom.
5/7/2009 08:01:15	-15.09383	-173.74719	743	243	8	1215	VIDEO Start recording HDCam
5/7/2009 08:01:21	-15.09383	-173.74720	744	243	7	1217	Bottom in sight.
5/7/2009 08:01:50	-15.09384	-173.74721	745	243	5	1218	We're looking at pillow lavas on the seafloor.
5/7/2009 08:01:58	-15.09384	-173.74721	746	243	5	1218	WATCHSTANDERS Susan Merle logger
5/7/2009 08:02:04	-15.09384	-173.74721	748	243	5	1218	WATCHSTANDERS Robert Embley watch leader
5/7/2009 08:02:08	-15.09384	-173.74721	749	243	5	1218	WATCHSTANDERS Rick Davis video
5/7/2009 08:02:57	-15.09384	-173.74721	750	243	4	1218	Seeing something shiny on the pillow lavas. Tim Shank says it's a larvacean (probably).
5/7/2009 08:03:47	-15.09384	-173.74721	752	243	4	1218	On the bottom starting the dive on the NE rift zone about 150m from Prometheus at the summit. **[Jason target info: Crest of NE rift zone. 15.093780S 173.747552W. Z=1174]**
5/7/2009 08:04:09	-15.09384	-173.74721	754	243	4	1219	Pillow lavas; lobate breccia - probably from flows that have come downslope.
5/7/2009 08:04:43	-15.09384	-173.74721	755	243	4	1219	Have only 30 to 40 pounds of payload here.
5/7/2009 08:05:36	-15.09384	-173.74721	757	243	4	1219	Dropping another weight.
5/7/2009 08:07:59	-15.09385	-173.74723	760	292	2	1219	SAMPLE Geology 1. **J414-rock-01**. Picking up an older piece of pillow fragment here. About 15cm long. Glass on the top. Whitish stain right below the upper glass rind. **(NE Flank area)**
5/7/2009 08:10:05	-15.09386	-173.74720	764	288	6	1218	J414-rock-01 cont. 15 5.635 173 44.827. Z=1217. **[Jason target info: J414-Rock-01. 15.093908S 173.747138W Z=1220.]**
5/7/2009 08:10:30	-15.09386	-173.74720	765	288	6	1218	J414-rock-01 cont. The position was doppler nav.
5/7/2009 08:12:28	-15.09387	-173.74728	769	276	4	1215	Moving on now. Heading 276. Heading along the summit to the SW.
5/7/2009 08:15:54	-15.09387	-173.74732	773	276	4	1212	Pile of large broken pillows.
5/7/2009 08:17:46	-15.09386	-173.74739	776	276	5	1202	Ambient temp = 3.6 C.
5/7/2009 08:18:24	-15.09383	-173.74743	778	276	5	1198	Biology floating in front of camera.
5/7/2009 08:18:49	-15.09383	-173.74743	779	276	6	1198	Some type of jellyfish.
5/7/2009 08:19:37	-15.09384	-173.74746	781	276	7	1196	Biology is some type of ctenophore.
5/7/2009 08:19:58	-15.09384	-173.74749	782	274	6	1194	Still climbing Z=1196.
5/7/2009 08:20:12	-15.09384	-173.74752	784	276	7	1192	Shelf like lava flows.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 08:20:46	-15.09378	-173.74755	785	276	7	1190	More sand. More staining.
5/7/2009 08:21:11	-15.09376	-173.74760	787	277	3	1191	Biology - fish.
5/7/2009 08:22:14	-15.09375	-173.74763	789	277	5	1188	Biology ophideid. Light colored fish.
5/7/2009 08:23:57	-15.09376	-173.74771	792	278	7	1180	More outcropping present.
5/7/2009 08:24:24	-15.09377	-173.74774	794	242	10	1176	Pyroclastics; big pillow rock.
5/7/2009 08:24:36	-15.09377	-173.74774	795	246	10	1174	At ridge crest.
5/7/2009 08:25:25	-15.09372	-173.74781	797	239	9	1174	Large outcrop. Plume present in background.
5/7/2009 08:26:13	-15.09368	-173.74785	799	240	8	1179	100 meters of Prometheus large plume present.
5/7/2009 08:27:39	-15.09364	-173.74790	801	336	12	1182	Moving into deeper water and attempting to approach from a different direction.
5/7/2009 08:29:57	-15.09358	-173.74780	804	337	6	1185	Depth 1186. Alt 5.6. Sitting still for the moment.
5/7/2009 08:30:18	-15.09357	-173.74780	806	337	6	1185	Waiting for the ship to position itself.
5/7/2009 08:31:40	-15.09344	-173.74783	808	337	5	1195	Outcropping visible in butt cam.
5/7/2009 08:32:28	-15.09343	-173.74780	810	163	5	1195	Bottom visible. Moving southeast.
5/7/2009 08:32:50	-15.09342	-173.74777	811	162	5	1191	Pillow coated with Fe oxide mat. Fresh flows.
5/7/2009 08:33:08	-15.09343	-173.74775	813	167	5	1189	Large pile of fresh pillows.
5/7/2009 08:33:54	-15.09349	-173.74771	814	161	7	1183	Trending upslope searching for source of plume.
5/7/2009 08:35:56	-15.09356	-173.74763	817	278	9	1177	Plume found Z=1175. Alt=8.7.
5/7/2009 08:36:49	-15.09362	-173.74761	819	279	4	1182	No visibility - surrounded by plume
5/7/2009 08:37:30	-15.09366	-173.74759	821	206	5	1180	Positioning Jason for better view.
5/7/2009 08:38:46	-15.09374	-173.74764	823	206	7	1170	Plume at 15 5.619 173 44.855 from USBL. **[Jason target info: Smoke Area. 15.093645S 173.747797W Z=1176.]**
5/7/2009 08:39:26	-15.09384	-173.74776	825	208	7	1167	More smoke from bottom; several pillow flows
5/7/2009 08:40:07	-15.09392	-173.74784	827	228	8	1168	Marking it active flow.
5/7/2009 08:40:52	-15.09385	-173.74790	828	329	10	1167	In plume - zero visibility. Z=1169; Alt 8.4.
5/7/2009 08:42:05	-15.09368	-173.74795	831	334	13	1175	Thick smoke in area where Embley observed active flow.
5/7/2009 08:43:07	-15.09367	-173.74786	833	96	21	1175	In plume no visibility.
5/7/2009 08:44:38	-15.09374	-173.74775	835	97	11	1175	Plume thickening. Over small pit.
5/7/2009 08:45:37	-15.09377	-173.74771	837	97	7	1172	Over small pit roughly 6m in diameter.
5/7/2009 08:46:51	-15.09380	-173.74768	839	97	8	1169	Bottom visible large outcrop.
5/7/2009 08:48:26	-15.09380	-173.74768	842	97	8	1169	Stationary while ship position itself.
5/7/2009 08:50:18	-15.09382	-173.74771	845	348	3	1171	Smoke coming out of large outcrop.
5/7/2009 08:50:54	-15.09383	-173.74772	846	334	3	1172	Biology -- Shrimp and floc.
5/7/2009 08:51:26	-15.09381	-173.74773	848	334	4	1170	Looking down into a pit which is producing smoke.
5/7/2009 08:52:22	-15.09383	-173.74772	850	338	4	1171	Large outcrop on one side of pit.
5/7/2009 08:52:51	-15.09384	-173.74774	851	334	4	1171	Embley observes pit is not as active as the other one.
5/7/2009 08:55:52	-15.09357	-173.74767	855	174	7	1185	Searching for active flow.
5/7/2009 08:56:28	-15.09355	-173.74769	857	165	9	1184	Moving South.
5/7/2009 08:57:23	-15.09365	-173.74766	859	172	8	1180	Reset DP.
5/7/2009 08:57:30	-15.09366	-173.74766	860	177	8	1180	NAV Doppler reset
5/7/2009 08:58:15	-15.09370	-173.74763	862	183	4	1181	Large pile of young pillows
5/7/2009 08:58:57	-15.09369	-173.74766	863	186	5	1181	Very young pillows.
5/7/2009 08:59:33	-15.09368	-173.74772	865	187	7	1183	In plume Z=1183 alt=6.2.
5/7/2009 08:59:50	-15.09368	-173.74771	866	174	4	1184	Searching for plume origin.
5/7/2009 09:00:59	-15.09372	-173.74775	868	54	2	1187	White rocks - bacterial mat.
5/7/2009 09:01:46	-15.09371	-173.74775	870	55	1	1187	Diffuse flow Z=1187 alt=0.3.
5/7/2009 09:02:33	-15.09370	-173.74775	872	54	1	1187	We're settling in here to sample this area of shimmering flow.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 09:03:30	-15.09369	-173.74774	874	54	1	1187	Large volume of shimmering flow here. Lots of nice white bacterial mat (?) on the rocks - could be sulfur staining.
5/7/2009 09:05:24	-15.09370	-173.74774	877	53	1	1187	Kohu is the Tongan name for smoke. We are naming this area **Kohu**. The general area is engulfed in smoke.
5/7/2009 09:06:32	-15.09371	-173.74774	879	55	1	1188	The white stain is not mat (Rick says). Just stained rock.
5/7/2009 09:06:56	-15.09372	-173.74774	880	55	1	1187	Preparing to sample here with the HFS.
5/7/2009 09:09:00	-15.09371	-173.74774	883	55	1	1188	This is a large area of diffuse flow. Lots of shimmer. Named the area Kohu.
5/7/2009 09:09:41	-15.09371	-173.74775	885	55	3	1186	The orange stuff on these rocks is probably on the surface of the rocks.
5/7/2009 09:10:49	-15.09369	-173.74774	887	63	3	1187	Beautiful pillows that are altered. No idea how old they are. Tambient=5.6.
5/7/2009 09:12:38	-15.09368	-173.74774	890	63	3	1187	Kohu 15 5.621 173 44.885. Z=1189. **[Jason target info: Kohu. 15.093718S 173.747666W. Z=1187.]**
5/7/2009 09:14:03	-15.09369	-173.74774	893	62	3	1187	Dave is measuring the temp here. It's rising. Temp ambient was 5.6. W
5/7/2009 09:14:56	-15.09369	-173.74774	894	62	3	1187	Low pH here. Temp got up to 31.1C. pH ~2.7.
5/7/2009 09:16:06	-15.09369	-173.74774	897	62	3	1187	SAMPLE Fluid 2. **J414-HFS-02** unfiltered piston #1. Start 091545. **(Kohu)**
5/7/2009 09:17:54	-15.09369	-173.74774	899	62	3	1187	The ambient temp was from Jason. The temp reading (31.1) and pH (2.7) both came from the HFS.
5/7/2009 09:18:38	-15.09369	-173.74774	901	62	3	1187	J414-HFS-02 cont. Don't see any exhaust coming out of the pump. Could be a problem. Kohu 15 5.621 173 44.885. Z=1189.
5/7/2009 09:20:10	-15.09370	-173.74774	904	62	3	1187	Dave is messing with the sampler. It might be a software problem. Dave is trying a couple things.
5/7/2009 09:22:27	-15.09370	-173.74774	907	62	3	1188	Still trying to get the HFS up and running.
5/7/2009 09:23:50	-15.09370	-173.74773	909	62	3	1187	Dave is giving up on that sample.
5/7/2009 09:25:36	-15.09370	-173.74773	912	62	3	1187	SAMPLE Fluid 3. **J414-HFS-03**. Unfiltered piston #24. Kohu. Start 092505. Z=1188. **(Kohu)**
5/7/2009 09:26:42	-15.09370	-173.74773	914	62	3	1187	There must have just been a problem with piston.
5/7/2009 09:27:49	-15.09369	-173.74773	916	62	3	1187	J414-HFS-03 cont. Stop 092715. Tmax=30.8 Tavg=30.4 Vol=459ml. T2=14.8. Kohu 15 5.621 173 44.885. Z=1189.
5/7/2009 09:29:50	-15.09368	-173.74774	919	62	3	1187	SAMPLE Fluid 4. **J414-HFS-04**. Unfiltered piston #4. Start 092943. **(Kohu)**
5/7/2009 09:32:09	-15.09369	-173.74774	923	62	3	1187	J414-HFS-04 cont. Same position as previous samples here at Kohu. Took a couple DSCs of the sampling here.
5/7/2009 09:34:01	-15.09370	-173.74774	926	62	3	1187	J414-HFS-04 cont. Stop 093324. Tmax=31.6. Tavg=30.6. Vol=535ml. T2=15. Kohu 15 5.621 173 44.885. Z=1189.
5/7/2009 09:35:29	-15.09370	-173.74775	928	63	3	1187	SAMPLE Fluid 5. **J414-HFS-05**. GFF filter#20 for Jim Cowen. Start 093504. **(Kohu)**
5/7/2009 09:36:46	-15.09370	-173.74775	930	63	3	1187	J414-HFS-05 cont. This will be a large volume sample. PI Butterfield / Cowen. Kohu. 15 5.621 173 44.885. Z=1189.
5/7/2009 09:44:20	-15.09370	-173.74774	939	62	3	1187	J414-HFS-05 cont. Biology; one lonely shrimp.
5/7/2009 09:45:04	-15.09370	-173.74775	941	63	3	1187	J414-HFS-05 cont. Still filtering POC sample for Cowen.
5/7/2009 09:49:20	-15.09369	-173.74773	946	63	3	1188	J414-HFS-05 cont. Stop 094834 Tmax=31.8 TAvg=30.9 vol=3023ml.
5/7/2009 09:51:00	-15.09369	-173.74773	948	62	3	1188	SAMPLE Fluid **J414-HFS-06**. DNA sample Sterivex filter #15 for Huber. Start 095054. Kohu 15 5.621 173 44.885. Z=1189. **(Kohu)**
5/7/2009 09:52:57	-15.09369	-173.74774	951	63	3	1187	J414-HFS-06 cont. Filter rate at 200ml/m.
5/7/2009 09:56:18	-15.09369	-173.74774	956	63	3	1187	J414-HFS-06 cont. This is going to be a larger sample could take a while.
5/7/2009 09:59:04	-15.09370	-173.74774	960	63	3	1187	SAMPLE Gas **J414-GTB-07** port gastight for Evans bottle #11. **(Kohu)**
5/7/2009 10:01:27	-15.09369	-173.74774	963	63	3	1187	SAMPLE Gas 7. J414-GTB-07 was fired previously. Port HFS GTB#11. Kohu 15 5.621 173 44.885. Z=1189.
5/7/2009 10:02:16	-15.09369	-173.74774	965	63	3	1187	SAMPLE Fluid 6. J414-HFS-06 continuing on. Took gastight simultaneously.
5/7/2009 10:03:45	-15.09369	-173.74773	967	63	3	1187	J414-HFS-06 cont. Dave is looking around here. Thick smoke visible in the buttcam.
5/7/2009 10:04:08	-15.09369	-173.74773	969	63	3	1187	VIDEO. Changed HDCam tape about 5 minutes ago.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 10:05:26	-15.09369	-173.74773	971	62	3	1187	J414-HFS-06 cont. Haven't seen any animals here or anything else - including bacteria.....
5/7/2009 10:07:07	-15.09369	-173.74773	974	62	3	1187	J414-HFS-06 cont. Stop 100630. Tmax=31.6. Tavg=29.8 Vol=3000ml. Kohu 15 5.621 173 44.885. Z=1189.
5/7/2009 10:09:07	-15.09369	-173.74774	977	63	3	1187	J414-HFS samples 2 - 7 pH didn't change. It's 2.64.
5/7/2009 10:10:40	-15.09368	-173.74774	979	63	3	1187	Ready to pick the wand up and stow it. We have decided not to deploy a marker here. Depth is 1187 and our heading is 62 degrees.
5/7/2009 10:12:44	-15.09368	-173.74774	982	63	3	1187	Dave wants to find the source of the smoke right here. We're going to look around.
5/7/2009 10:13:02	-15.09369	-173.74774	984	62	3	1187	Want to pick up and slowly turn to the east and look for the source of the smoke.
5/7/2009 10:14:52	-15.09374	-173.74774	986	27	1	1186	Spinning around here. See an errant shrimp or two in the water column.
5/7/2009 10:15:45	-15.09370	-173.74782	988	309	5	1188	We see small stuff darting around. Tim says they must be amphipods.
5/7/2009 10:17:02	-15.09356	-173.74780	991	43	5	1197	Temp is fluctuating a bit.
5/7/2009 10:19:42	-15.09342	-173.74792	994	220	2	1209	We'll either find the source of this smoke or we will head on up slope.
5/7/2009 10:20:33	-15.09349	-173.74791	996	176	5	1201	Lots of little guys swimming around. They are either amphipods or shrimp larvae or both.
5/7/2009 10:22:07	-15.09361	-173.74793	999	78	4	1200	The plume is incredibly thick here. Medea's cam shows a huge plume. Taking out wraps in the tether.
5/7/2009 10:26:06	-15.09369	-173.74792	1004	174	3	1198	The smoke seems to be rising out of the seafloor all around here. Don't see any venting though.
5/7/2009 10:27:05	-15.09358	-173.74789	1006	174	7	1198	Don't want a rock here because the rock is all altered here.
5/7/2009 10:27:52	-15.09351	-173.74785	1007	169	6	1202	The plan is to move upslope to the SW and see what we find on the way.
5/7/2009 10:30:02	-15.09350	-173.74777	1011	180	5	1200	Intact pillow tubes are hanging off this steep outcrop. could have had a dike injection here. Orange staining.
5/7/2009 10:30:31	-15.09356	-173.74779	1012	180	4	1198	Following the chute here heading upslope. Lots of rubble.
5/7/2009 10:31:12	-15.09361	-173.74784	1014	193	3	1196	More smoke diffusing out of the slope here.
5/7/2009 10:31:59	-15.09360	-173.74789	1015	184	3	1200	Lots of altered rock. Looking at a smoke probably leaking through the seafloor.
5/7/2009 10:32:51	-15.09368	-173.74795	1017	179	6	1197	coming into some shrimp hanging out on the rocks.
5/7/2009 10:33:34	-15.09373	-173.74799	1019	134	8	1197	Seeing alteration in the cracks of the pillows. Some shrimp here in the area.
5/7/2009 10:35:42	-15.09385	-173.74807	1022	194	3	1196	The lavas are ropier up here. Pyroclastic seds on parts of this outcrop.
5/7/2009 10:36:38	-15.09388	-173.74808	1024	198	4	1193	We're about 55m to the N/NE of Prometheus.
5/7/2009 10:37:20	-15.09390	-173.74808	1026	196	4	1191	The shrimp density is improving but still not super dense.
5/7/2009 10:38:45	-15.09394	-173.74808	1028	211	4	1188	Really long pillow here. We are following it up to the top. This is a pillow tube.
5/7/2009 10:39:18	-15.09395	-173.74808	1030	211	3	1187	There must have been a vent here at one time but it must have just fallen away.
5/7/2009 10:39:31	-15.09395	-173.74808	1031	211	4	1186	Continuing on.
5/7/2009 10:40:43	-15.09399	-173.74809	1033	194	4	1183	Seeing some shrimp etc. Broken up long pillows.
5/7/2009 10:41:29	-15.09402	-173.74809	1035	178	2	1181	We see some venting here and shrimp grazing on it.
5/7/2009 10:43:05	-15.09400	-173.74808	1038	152	3	1181	Lots of shrimp taking off as we approach. There's quite a swarm of shrimp grazing on the white mat.
5/7/2009 10:44:04	-15.09400	-173.74808	1040	217	3	1180	Beautiful spot here. Large plume in the distance.
5/7/2009 10:46:42	-15.09401	-173.74808	1043	136	3	1181	Looking at a beautiful area here. Curved pillow features here covered with bacterial mat and shrimp.
5/7/2009 10:48:07	-15.09402	-173.74809	1046	136	3	1181	Jason shift is swapping out. Will is now the pilot.
5/7/2009 10:48:55	-15.09402	-173.74810	1047	136	3	1181	Tim thinks that there are probably a lot of pregnant females there.
5/7/2009 10:49:09	-15.09402	-173.74810	1049	136	3	1181	Amazing amount of biology here.
5/7/2009 10:49:42	-15.09402	-173.74810	1050	136	3	1181	We're only about 40 or 50m N/NE of Prometheus.
5/7/2009 10:52:34	-15.09402	-173.74810	1054	137	3	1181	Zoarcid fish swimming around. The first we've seen.
5/7/2009 10:54:06	-15.09401	-173.74810	1057	138	3	1181	Going to poke around check the temp in this crevice where there is a little shimmer lots of white mat and tons of shrimp.
5/7/2009 10:58:02	-15.09403	-173.74810	1062	138	3	1181	Pulling out the wand and measuring the temp. It's about 11 degrees and rising.
5/7/2009 10:59:10	-15.09403	-173.74810	1064	138	3	1181	Temp is now 12.5. Went in about 5 inches and hit hard rock.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 11:00:38	-15.09403	-173.74810	1066	138	3	1181	Looking at the shrimp on this piece of lava with no mat. Shrimp are pretty thick here.
5/7/2009 11:01:53	-15.09402	-173.74810	1068	138	3	1181	Temp is 14 degrees here and barely rising.
5/7/2009 11:02:15	-15.09402	-173.74809	1070	138	3	1181	Temp here is almost 15 degrees. Will take a sample or two here.
5/7/2009 11:03:42	-15.09401	-173.74809	1072	138	3	1181	Lots of these shrimp are full of eggs.
5/7/2009 11:04:53	-15.09401	-173.74809	1074	138	3	1181	pH of 5.63 here. Naming this place **Shrimp City**. **[Jason target info: Shrimp City. 15.094023S 173.748098W. Z=1182.]**
5/7/2009 11:07:46	-15.09402	-173.74809	1078	138	3	1181	SAMPLE Fluid 8. **J414-HFS-08**. Filtered bag #23. Z=1182. Start 1106. **(Shrimp City)**
5/7/2009 11:08:50	-15.09403	-173.74809	1080	138	3	1181	J414-HFS-08 cont. Location 15 5.642 173 44.885. Z=1182. Shrimp City.
5/7/2009 11:09:57	-15.09403	-173.74809	1082	138	3	1181	J414-HFS-08 cont. Stop 1109. Tmax=14.9 Tavg=14.8. Vol=500ml.
5/7/2009 11:11:49	-15.09403	-173.74809	1085	138	3	1181	SAMPLE Fluid 9. **J414-HFS-09**. Filtered bag #19. Start 111120. J414-HFS-09. **(Shrimp City)**
5/7/2009 11:15:51	-15.09402	-173.74809	1090	138	3	1181	J414-HFS-09 cont. Shrimp City. PI Butterfield. Stop 111512. Tmax=14.8 Tavg=14.7. Vol=501ml. Location 15 5.642 173 44.885. Z=1182. Shrimp City.
5/7/2009 11:18:08	-15.09402	-173.74809	1094	138	3	1181	SAMPLE Fluid 10. **J414-HFS-10**. Sterivex #14. Start 1117. Location 15 5.642 173 44.885. Z=1182. **(Shrimp City)**
5/7/2009 11:19:16	-15.09401	-173.74809	1096	138	3	1181	J414-HFS-10. PI is actually Huber. Shrimp City. This will be a large volume sample.
5/7/2009 11:29:06	-15.09401	-173.74811	1107	138	3	1181	Lasers are on. 10 cm spacing.
5/7/2009 11:31:39	-15.09402	-173.74810	1110	138	3	1181	Nav Doppler reset.
5/7/2009 11:33:29	-15.09403	-173.74809	1113	138	3	1181	J414-HFS-10 cont. Tmax=14.8 Vol=3002ml Tavg=14.6. Shrimp City.
5/7/2009 11:33:52	-15.09402	-173.74809	1114	138	3	1181	Finished with the fluid sampler. Will suction some of those shrimp next.
5/7/2009 11:35:28	-15.09402	-173.74809	1117	137	4	1181	Stowing the beast wand.
5/7/2009 11:49:37	-15.09401	-173.74809	1134	137	4	1181	Stowed the arm and are preparing to suction shrimp at Shrimp City.
5/7/2009 11:52:18	-15.09404	-173.74810	1138	137	3	1180	Tim Shank is on the microphone now.
5/7/2009 11:55:31	-15.09405	-173.74808	1142	137	3	1180	SAMPLE Biology 11. **J414-shrimp-11**. Suction of shrimp here where the last 4 samples were taken. Z=1181. **(Shrimp City)**
5/7/2009 11:56:34	-15.09404	-173.74809	1144	138	4	1180	J414-shrimp-11 cont. End of suction sample here at Shrimp City. Got lots of shrimp here. Probably 40 or more.
5/7/2009 11:57:02	-15.09404	-173.74809	1145	138	4	1180	Stowing the suction tube.
5/7/2009 11:59:12	-15.09402	-173.74811	1149	145	4	1180	We plan to move up the ridge toward Prometheus next. Hose is stowed and we are on the move.
5/7/2009 11:59:32	-15.09402	-173.74811	1150	145	4	1179	Swapping out HDCam tape.
5/7/2009 12:00:55	-15.09405	-173.74809	1152	154	4	1176	Will take a sample for Ken here. Still lots of shrimp but no microbial mat here.
5/7/2009 12:02:58	-15.09406	-173.74807	1155	165	4	1175	Just up slope from Shrimp City will be the rock sampling stuff.
5/7/2009 12:03:59	-15.09406	-173.74806	1157	165	4	1175	SAMPLE Geology 12. **J414-rock-12**. Piece of very friable rock from this section of pillows. **(Upslope from Shrimp City)**
5/7/2009 12:05:47	-15.09404	-173.74807	1160	161	5	1175	J414-rock-12 cont. Sample is about 15cm long pillow fragment. Really friable. Decent glassy rind. Very vesicular.
5/7/2009 12:07:23	-15.09408	-173.74807	1163	183	7	1170	J414-rock-12 cont. Location 15 5.643 173 44.885. Z=1176. Maybe 20 meters away from Shrimp City.
5/7/2009 12:08:11	-15.09410	-173.74806	1165	139	13	1162	We're probably right at the summit now or close to it.
5/7/2009 12:08:33	-15.09410	-173.74805	1166	139	11	1163	The HD Cam flipped out just a minute ago.
5/7/2009 12:09:48	-15.09417	-173.74810	1168	200	8	1163	Here comes the plume. We're on our way to Prometheus.
5/7/2009 12:10:48	-15.09418	-173.74812	1170	196	11	1161	We are seeing a bunch of ash in the plume. We're about 20m from Prometheus.
5/7/2009 12:11:36	-15.09414	-173.74812	1172	197	16	1161	We are seeing a plume that is probably from Prometheus or something else.
5/7/2009 12:18:24	-15.09427	-173.74840	1180	194	16	1159	We're in the plume trying to hone in on Prometheus.
5/7/2009 12:23:57	-15.09432	-173.74839	1186	96	15	1160	***NAV Doppler reset.*** That moved the nav about 10 meters.
5/7/2009 12:25:38	-15.09435	-173.74838	1189	96	4	1167	Can see the bottom. Lots of shimmering water and some kind of mat or alteration.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 12:31:07	-15.09438	-173.74828	1196	5	4	1165	Obviously are not in the right place. The marker at Red Rock Ridge was just right in front of us (Mkr-154). **[Jason target info: Red Rock Ridge Mkr-154. 15.094617S 173.748617W. Z=1180.]**
5/7/2009 12:32:15	-15.09437	-173.74829	1198	308	3	1165	Having difficulty finding Prometheus. Obviously overshot the vent. Probably by about 50m.
5/7/2009 12:34:33	-15.09431	-173.74827	1201	22	3	1163	Not doing so great finding our way to Prometheus.
5/7/2009 12:36:47	-15.09423	-173.74822	1204	102	7	1168	We have finally found what we think the vent.
5/7/2009 12:37:56	-15.09418	-173.74817	1206	105	8	1172	We're looking at **Prometheus** here - finally. **[Jason target info: Prometheus-J414. 15.094200S 173.748167W. Z=1174.]**
5/7/2009 12:38:02	-15.09418	-173.74817	1207	106	8	1172	NAV Doppler reset
5/7/2009 12:38:30	-15.09418	-173.74817	1209	106	7	1172	We see some orange flaming at the back of the vent.
5/7/2009 12:38:33	-15.09418	-173.74816	1210	105	7	1172	Lasers off.
5/7/2009 12:39:20	-15.09417	-173.74816	1212	104	6	1172	The HD Cam looks a lot better after bringing the iris down.
5/7/2009 12:40:41	-15.09416	-173.74815	1214	139	6	1172	After our doppler shift we are finally here. The difference between today and yesterday is about 15m.
5/7/2009 12:41:19	-15.09417	-173.74815	1216	139	6	1172	Our depth is still 1173. Looking at it from a heading of 139 degrees. Altitude is 15m. Prometheus.
5/7/2009 12:42:10	-15.09418	-173.74815	1218	139	6	1172	Lots of tephra coming out of here. We see lots of red at several places .
5/7/2009 12:44:35	-15.09419	-173.74816	1221	140	7	1172	Zooming out a bit to take a good look at the eruptive site. Lots of areas where we are seeing red molten rock.
5/7/2009 12:44:56	-15.09419	-173.74816	1222	140	7	1172	Looking at Prometheus.
5/7/2009 12:46:22	-15.09418	-173.74816	1225	139	8	1172	It is continuously flaming. Probably some kind of gas burning - probably hydrogen burning.
5/7/2009 12:46:55	-15.09418	-173.74816	1226	140	7	1172	It has to be disassociation of sea water.
5/7/2009 12:47:27	-15.09418	-173.74816	1228	140	7	1172	Microbes make water from hydrogen and oxygen too.
5/7/2009 12:47:48	-15.09418	-173.74816	1229	140	6	1172	Microbes don't make hydrogen in water (Davis).
5/7/2009 12:52:41	-15.09423	-173.74815	1235	139	5	1174	Preparing to take some water samples with the HFS right now. Tamb=3.6. Dave is trying to get a temp as close as possible to the vent orifice.
5/7/2009 12:53:49	-15.09423	-173.74815	1237	139	5	1174	Temp is still going up. The probe is not in the fluids.
5/7/2009 12:56:04	-15.09422	-173.74814	1241	139	5	1174	SAMPLE Fluid 13. **J414-HFS-13**. Filtered piston #2. Started 1254. Z=1174m. New lat long 15 5.652 173 44.890. **(Prometheus)**
5/7/2009 12:57:18	-15.09419	-173.74816	1243	139	5	1174	J414-HFS-13 cont. Stop 125650. Tmax=47.5 Tavg=30.4 Vol=450ml.
5/7/2009 12:58:29	-15.09420	-173.74815	1245	139	5	1174	Repositioning the nozzle. Can't really see what's happening. Haven't moved.
5/7/2009 13:00:06	-15.09421	-173.74815	1248	139	5	1174	SAMPLE Fluid 14. **J414-HFS-14**. Filtered Piston#3. Started 1259. Directly in plume. 1174m. New lat long dive J414 15 5.652 173 44.890. **(Prometheus)**
5/7/2009 13:01:02	-15.09421	-173.74815	1249	138	4	1174	J414-HFS-14 cont. Stopped 1300. Tmax=69.5 Tavg=58.0 vol=354.
5/7/2009 13:02:38	-15.09421	-173.74815	1253	139	4	1174	Giving the pump a break.
5/7/2009 13:03:07	-15.09421	-173.74815	1255	139	4	1174	Picking another spot.
5/7/2009 13:04:48	-15.09420	-173.74815	1257	138	5	1174	Bolt is loose and having a hard time rotating probe.
5/7/2009 13:05:21	-15.09420	-173.74815	1259	138	4	1174	Need to be careful not to touch rock or anything molten.
5/7/2009 13:08:00	-15.09419	-173.74814	1262	138	4	1174	Getting ready to take another sample.
5/7/2009 13:08:21	-15.09419	-173.74814	1264	138	5	1174	Taking a gastight too.
5/7/2009 13:09:13	-15.09419	-173.74814	1266	138	5	1174	SAMPLE Fluid 15. **J414-HFS-15**. Starting Filtered Piston #5. 1309. **(Prometheus)**
5/7/2009 13:10:03	-15.09419	-173.74813	1268	138	4	1174	J414-HFS-15 cont. In plume at Prometheus. 1174m. Butterfield.
5/7/2009 13:11:20	-15.09420	-173.74814	1270	138	5	1174	J414-HFS-15 cont. Stopped. Tmax=25.9. Tavg=23. Vol=385. Stopped at 1311. New lat long dive J414 15 5.652 173 44.890.
5/7/2009 13:11:42	-15.09420	-173.74814	1271	138	5	1174	Watching temperature. Will take gas tight if it goes up a little.
5/7/2009 13:11:52	-15.09420	-173.74814	1272	138	5	1174	Temperature has decreased to 10
5/7/2009 13:12:37	-15.09420	-173.74815	1274	138	4	1174	Vent is vigorously billowing with tephra and red flame at base.
5/7/2009 13:13:43	-15.09420	-173.74816	1276	138	5	1172	Plume enveloping Jason. Want to move around a little.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 13:14:08	-15.09420	-173.74817	1278	125	6	1172	Lifting off temporarily.
5/7/2009 13:14:31	-15.09420	-173.74817	1279	124	5	1173	Jason about 5 meters above seafloor.
5/7/2009 13:14:53	-15.09420	-173.74816	1280	127	2	1174	Coming back down to try again.
5/7/2009 13:16:25	-15.09420	-173.74815	1283	123	1	1174	Positioning probe into plume.
5/7/2009 13:18:44	-15.09420	-173.74815	1286	121	1	1174	Getting ready to take sample.
5/7/2009 13:20:28	-15.09419	-173.74815	1289	126	1	1174	Changing position for better approach to vent
5/7/2009 13:22:37	-15.09420	-173.74818	1292	125	7	1173	Backed away and will approach vent again.
5/7/2009 13:23:09	-15.09420	-173.74819	1294	124	7	1173	Bolt on fluid sampler arm is loose and making it difficult to maneuver probe.
5/7/2009 13:23:50	-15.09421	-173.74819	1295	124	8	1173	Getting better grip on fluid sampler arm.
5/7/2009 13:25:07	-15.09421	-173.74820	1298	124	7	1173	Now have better control of handle.
5/7/2009 13:25:23	-15.09420	-173.74819	1299	125	6	1173	Descending to vent again.
5/7/2009 13:26:02	-15.09421	-173.74816	1300	128	1	1174	Plume is full of tephra falling out.
5/7/2009 13:26:41	-15.09420	-173.74816	1302	127	1	1174	Positioning fluid sampler probe back in plume.
5/7/2009 13:27:44	-15.09420	-173.74816	1304	127	1	1174	Most vigorous part of plume is very heavily loaded with tephra raining out.
5/7/2009 13:29:32	-15.09419	-173.74815	1307	126	1	1174	SAMPLE Gas 16. **J414-GTB-16**. Stbd manifold gastight #9 fired 1329. Temp went from 62 to 78 when fired. Then temp went down. New lat long dive J414. 15 5.652 173 44.890. **(Prometheus)**
5/7/2009 13:29:41	-15.09419	-173.74815	1308	126	1	1174	Pump is still going.
5/7/2009 13:30:25	-15.09419	-173.74815	1310	127	1	1174	SAMPLE Fluid 17. **J414-HFS-17**. Unfiltered Piston#6. Started 132950. New lat long dive J414. 15 5.652 173 44.890. **(Prometheus)**
5/7/2009 13:31:05	-15.09419	-173.74815	1312	127	1	1174	J414-HFS-17. Stopped 133035. Not necessary to note temp as came out of plume.
5/7/2009 13:31:38	-15.09419	-173.74816	1313	108	3	1175	Repositioning Jason
5/7/2009 13:32:01	-15.09420	-173.74816	1314	112	2	1173	Loads of tephra falling out all around Jason
5/7/2009 13:32:31	-15.09419	-173.74815	1316	131	2	1173	Approaching vent again.
5/7/2009 13:34:48	-15.09420	-173.74814	1319	130	4	1173	Vent is flashing red at base again
5/7/2009 13:35:06	-15.09419	-173.74814	1321	112	2	1173	Plume has steady stream of tephra falling out.
5/7/2009 13:35:43	-15.09419	-173.74814	1322	112	3	1173	Difficult to approach vent
5/7/2009 13:35:51	-15.09419	-173.74815	1323	114	3	1173	Backing away again
5/7/2009 13:36:22	-15.09419	-173.74815	1325	114	3	1173	Lots of tephra raining onto Jason
5/7/2009 13:37:03	-15.09419	-173.74815	1326	114	3	1173	Dave is pumping fluid sampler in reverse to clear it. Smoke is coming out of end.
5/7/2009 13:37:27	-15.09419	-173.74816	1328	114	3	1173	Stopped pumping in reverse
5/7/2009 13:38:40	-15.09419	-173.74816	1330	114	3	1173	Lots of red at base of plume
5/7/2009 13:39:23	-15.09419	-173.74817	1332	116	3	1173	Bigger rocks getting blasted out of vent. The rocks are getting ejected then fall back in only to be ejected again.
5/7/2009 13:39:33	-15.09419	-173.74817	1333	115	3	1173	Flashing and flame
5/7/2009 13:39:51	-15.09419	-173.74817	1334	114	3	1173	Flame is extremely prominent and continuous!
5/7/2009 13:40:44	-15.09419	-173.74817	1336	114	4	1173	Dave says that with this type of lava should get white-hot
5/7/2009 13:41:01	-15.09419	-173.74816	1337	114	4	1173	Suddenly just blew itself out.
5/7/2009 13:41:47	-15.09418	-173.74816	1339	115	3	1173	Now flames are starting again.
5/7/2009 13:43:32	-15.09418	-173.74815	1342	114	5	1173	Vent is still exploding and flashing with lots of tephra falling out of plume.
5/7/2009 13:44:17	-15.09418	-173.74814	1344	114	4	1173	Plume is quite heavily loaded with tephra.
5/7/2009 13:45:11	-15.09419	-173.74815	1346	114	4	1173	Sustained flame at base of plume
5/7/2009 13:45:27	-15.09419	-173.74815	1347	114	3	1173	Rocks get sucked in from sides then get blasted up into plume.
5/7/2009 13:47:28	-15.09419	-173.74815	1350	114	4	1173	Sustained flaming still continuing.
5/7/2009 13:47:51	-15.09419	-173.74815	1351	114	3	1173	Dave wants to try to take a sample just above the flaming spot
5/7/2009 13:50:55	-15.09419	-173.74814	1355	117	1	1174	Vent still flaming
5/7/2009 13:52:35	-15.09419	-173.74814	1358	96	1	1174	Still watching flaming and tephra falling out of plume

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 13:53:36	-15.09419	-173.74814	1360	97	1	1174	SAMPLE Fluid 18. **J414-HFS-18**. Filtered Piston #7. Starting 135330. New lat long dive J414. 15 5.652 173 44.890. **(Prometheus)**
5/7/2009 13:54:22	-15.09418	-173.74814	1362	96	1	1174	J414-HFS-18 cont. Dave says seems like the whole thing seems clogged up.
5/7/2009 13:55:26	-15.09417	-173.74813	1364	97	1	1174	J414-HFS-18 cont. stopped 135520.
5/7/2009 13:55:50	-15.09418	-173.74813	1365	97	1	1174	J414-HFS-18 cont. Tmax=41.6 Tavg=38 Vol=319ml.
5/7/2009 13:56:40	-15.09418	-173.74813	1367	97	1	1174	SAMPLE Fluid 19. **J414-HFS-19**. Unfiltered Piston#8. Started 1356. **(Prometheus)**
5/7/2009 13:58:22	-15.09419	-173.74815	1370	96	1	1174	J414-HFS-19 cont. No pump exhaust. Does not seem to be working. Stopped 1358.
5/7/2009 13:58:47	-15.09419	-173.74815	1371	96	1	1174	J414-HFS-19 cont. Tmax=45.5 Tavg=42.8 vol=unknown. New lat long dive J414. 15 5.652 173 44.890. Prometheus.
5/7/2009 13:59:08	-15.09419	-173.74815	1373	96	1	1174	Going to try another one.
5/7/2009 13:59:39	-15.09420	-173.74817	1375	99	8	1172	SAMPLE Fluid Lifting off vent for a bit.
5/7/2009 14:02:36	-15.09420	-173.74818	1379	116	6	1173	Raining rocks all around as Jason gets into plume
5/7/2009 14:04:33	-15.09418	-173.74815	1382	104	2	1174	Fluid sampler seems to not be working properly. Not getting what Dave expects to see at exhaust. Either leaking or clogged?
5/7/2009 14:05:25	-15.09418	-173.74815	1384	89	1	1174	Going to try sampling again.
5/7/2009 14:05:33	-15.09418	-173.74815	1385	89	1	1174	Placing probe into plume
5/7/2009 14:06:59	-15.09418	-173.74816	1387	89	1	1174	Temp is around 13
5/7/2009 14:07:11	-15.09418	-173.74816	1389	88	1	1174	Waiting to see it temperature goes up
5/7/2009 14:08:28	-15.09418	-173.74816	1391	89	1	1174	Pump is probably clogged. Not getting anything at exhaust.
5/7/2009 14:11:39	-15.09420	-173.74815	1395	93	2	1173	Changed HiDef tape
5/7/2009 14:11:53	-15.09420	-173.74815	1396	92	3	1173	Putting HFS wand away and going to try a gastight
5/7/2009 14:16:20	-15.09419	-173.74817	1402	94	6	1174	Just put wand away. Now maneuvering for gastight
5/7/2009 14:17:53	-15.09419	-173.74817	1404	93	6	1173	Reaching for gastight
5/7/2009 14:18:32	-15.09418	-173.74816	1406	93	6	1174	Grabbing black and white gastight from basket
5/7/2009 14:21:24	-15.09419	-173.74814	1410	105	2	1174	Approaching vent again
5/7/2009 14:22:32	-15.09419	-173.74814	1412	105	1	1174	SAMPLE Gas 20. **J414-GTB-20**. GTB#5 from basket. 1175m. New lat long dive J414. 15 5.652 173 44.890. **(Prometheus)**
5/7/2009 14:23:10	-15.09419	-173.74814	1414	105	1	1174	20. J414-GTB-20 cont. waiting for blast from vent.
5/7/2009 14:24:29	-15.09419	-173.74815	1416	105	1	1174	20. J414-GTB-20 cont. Still waiting for better activity at vent.
5/7/2009 14:26:49	-15.09419	-173.74814	1419	105	1	1174	20. J414-GTB-20 cont. Still waiting for vent to cooperate. Want the sample to be just right.
5/7/2009 14:28:32	-15.09419	-173.74813	1422	105	1	1174	20. J414-GTB-20 cont. Placing into plume again.
5/7/2009 14:29:05	-15.09419	-173.74813	1424	104	1	1174	20. J414-GTB-20 cont. Fired.
5/7/2009 14:29:27	-15.09419	-173.74814	1425	104	2	1174	20. J414-GTB-20 cont. Bottle was well into smoke. Lots of yellow in plume.
5/7/2009 14:29:54	-15.09420	-173.74815	1426	107	2	1174	Going to take another gastight.
5/7/2009 14:30:13	-15.09420	-173.74815	1428	106	2	1174	Replacing Black and White gastight into basket
5/7/2009 14:31:08	-15.09419	-173.74815	1430	107	2	1174	Securing black and white gastight.
5/7/2009 14:31:26	-15.09419	-173.74815	1431	107	2	1174	Going to get Black and Orange next - GTB#7
5/7/2009 14:35:37	-15.09419	-173.74816	1436	106	2	1174	Getting ready to take Gastight Orange/Black - GTB#7
5/7/2009 14:35:43	-15.09419	-173.74816	1437	106	2	1174	Approaching vent again
5/7/2009 14:36:02	-15.09420	-173.74815	1438	102	2	1173	Vent is vigorously venting.
5/7/2009 14:37:28	-15.09420	-173.74814	1441	64	3	1174	SAMPLE Gas 21. **J414-GTB-21**. Gastight GTB#7. 1175m. Vent is flaming. New lat long dive J414. 15 5.652 173 44.890. **(Prometheus)**
5/7/2009 14:37:54	-15.09420	-173.74814	1442	65	3	1174	21. J414-GTB-21 cont. Placing gastight over flames. Fired.
5/7/2009 14:38:56	-15.09422	-173.74815	1444	73	4	1173	Replacing gastight Orange/Black into basket.
5/7/2009 14:40:46	-15.09422	-173.74816	1447	71	4	1173	Getting ready to collect some rocks at the rim of the vent.
5/7/2009 14:41:02	-15.09422	-173.74815	1448	71	4	1173	NAV Doppler reset

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 14:42:02	-15.09421	-173.74814	1450	85	3	1173	Watching vent while waiting.
5/7/2009 14:42:54	-15.09421	-173.74814	1452	84	4	1173	Observing that material falling out of plume is falling back into vent and then being ejected again. A recycling of material. Even some large chunks from rim get pulled back in.
5/7/2009 14:43:09	-15.09421	-173.74814	1454	84	4	1173	10m offset to NE due to doppler reset.
5/7/2009 14:44:01	-15.09421	-173.74814	1455	84	3	1173	Vigorous phase with lots of fragmentation cycles to phase with glowing at bottom.
5/7/2009 14:44:27	-15.09421	-173.74814	1457	84	3	1173	Plume and water being drawn in at base and tephra gets tumbled around in plume.
5/7/2009 14:47:23	-15.09423	-173.74815	1461	85	5	1173	getting ready to collect scoria from around the rim
5/7/2009 14:52:14	-15.09421	-173.74815	1467	86	3	1174	SAMPLE Geology 22. **J414-rock-22**. Grabbed from edge of rim. Placed in GeoBox#3. Z=1175. Jason heading 086. **(Prometheus)**
5/7/2009 14:54:45	-15.09418	-173.74816	1470	53	3	1174	Moving away from Prometheus. Want to head to NE a bit along ridge.
5/7/2009 14:55:12	-15.09415	-173.74811	1472	61	6	1174	Lots of staining on rocks around vent.
5/7/2009 14:55:48	-15.09411	-173.74806	1473	63	5	1174	Looks like sheet flows. Shrimp present.
5/7/2009 14:56:08	-15.09409	-173.74803	1475	69	5	1174	Looking behind us Prometheus is flaming away.
5/7/2009 14:56:31	-15.09409	-173.74802	1476	71	6	1171	Steep wall nearly vertical as Jason moves to NE away from vent.
5/7/2009 14:56:50	-15.09409	-173.74802	1477	92	8	1169	Lavas very close to being columnar jointed.
5/7/2009 14:57:07	-15.09409	-173.74803	1479	85	12	1167	Bacterial mat present.
5/7/2009 14:57:39	-15.09410	-173.74802	1480	97	16	1163	Extensive bacterial mat on upper part of this outcrop. Still moving up wall.
5/7/2009 14:58:00	-15.09412	-173.74800	1481	97	15	1160	Scarp is draped with new lava. Pyroclastics on top.
5/7/2009 14:58:29	-15.09413	-173.74797	1483	73	4	1160	Dark patches of sand on slope.
5/7/2009 14:59:07	-15.09414	-173.74793	1485	86	3	1159	Jason now at 1163m. Seem to be at top of ridge. Dense shrimp population.
5/7/2009 14:59:49	-15.09415	-173.74794	1486	86	3	1160	Shimmering water.
5/7/2009 15:00:43	-15.09415	-173.74794	1488	85	3	1160	Orange patches may be iron or bacterial precipitates. Anna Louise thinks it looks more mineral. Lots of shimmering water all about.
5/7/2009 15:01:31	-15.09416	-173.74795	1490	86	3	1160	Want to stick temp probe into sand.
5/7/2009 15:03:07	-15.09415	-173.74796	1493	86	3	1160	These shrimp are "enthusiastic" compared to the other site.
5/7/2009 15:03:39	-15.09415	-173.74796	1494	85	3	1160	Temperature probe being inserted into sand.
5/7/2009 15:04:41	-15.09415	-173.74796	1496	85	3	1160	NAV Doppler reset
5/7/2009 15:04:55	-15.09415	-173.74796	1497	85	3	1160	SE of Shrimp City about 12m.
5/7/2009 15:05:15	-15.09415	-173.74796	1499	85	3	1160	Temperature=23.5
5/7/2009 15:06:36	-15.09415	-173.74795	1501	85	3	1160	Temperature max=25.0
5/7/2009 15:08:14	-15.09416	-173.74795	1504	84	3	1160	Want to get some of the orange hydrothermal material. Will use scoop sampler to get it as well as some of the sand.
5/7/2009 15:10:57	-15.09415	-173.74797	1507	83	3	1160	SAMPLE Geology 23. **J414-sed-23**. Using Rick's scoop sampler to get hydrothermal deposit and sand. Location 15 5.649 S 173 44.879 W. **(~14m SE of Shrimp City)**
5/7/2009 15:13:56	-15.09415	-173.74796	1511	83	3	1160	23. J414-sed-23 cont. 1161m. Handle turned counterclockwise to open. Want to get orange crust and sand.
5/7/2009 15:15:46	-15.09415	-173.74794	1514	82	3	1160	23. J414-sed-23 cont. Getting chunks of the orange stuff as well as sand. Orange pieces are pretty hard and not breaking up as being scooped. Trying to get smaller pieces that fit in tube opening.
5/7/2009 15:17:00	-15.09416	-173.74795	1516	81	3	1160	23. J414-sed-23 cont. Tube is about 1/3 full but material at top is not settling into tube. Tapping tube to get it in.
5/7/2009 15:20:17	-15.09418	-173.74801	1521	81	3	1160	23. J414-sed-23 cont. Used other arm to poke material at top into tube. Now closing tube.
5/7/2009 15:21:49	-15.09418	-173.74801	1523	81	4	1160	23. J414-sed-23 cont. Placing tube in basket with valve end outboard.
5/7/2009 15:23:17	-15.09417	-173.74799	1526	81	3	1160	Moving Jason to top of peak.
5/7/2009 15:25:11	-15.09418	-173.74797	1529	58	4	1160	Can see plume from Prometheus below and behind Jason in aft cam image.
5/7/2009 15:26:02	-15.09416	-173.74794	1530	67	2	1159	Coming up to top of cone. Ridge continues to NE. Jason heading is 066.
5/7/2009 15:26:47	-15.09415	-173.74793	1532	65	2	1159	Now need to move SW to Red Rock Ridge.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 15:28:10	-15.09416	-173.74795	1535	66	3	1160	Jason moving west then south to avoid Prometheus plume.
5/7/2009 15:30:27	-15.09415	-173.74797	1538	66	3	1162	Backing over steep wall. Shrimp all over the place.
5/7/2009 15:30:50	-15.09415	-173.74797	1539	66	3	1162	Shimmering water along wall.
5/7/2009 15:32:58	-15.09420	-173.74801	1542	87	6	1166	Rocks raining off top of vehicle.
5/7/2009 15:33:22	-15.09421	-173.74802	1544	95	4	1168	Lots of black sand on top of older lava flow.
5/7/2009 15:34:23	-15.09421	-173.74805	1546	105	6	1170	Lots of hydrothermal mat on outcrops and sand.
5/7/2009 15:35:11	-15.09420	-173.74810	1548	122	6	1173	Passing over Prometheus.
5/7/2009 15:36:47	-15.09419	-173.74816	1550	105	3	1176	Prometheus sits at base of steep wall that goes to top of ridge. Cinder cone has built up around Prometheus.
5/7/2009 15:37:54	-15.09418	-173.74824	1552	164	10	1176	Debris from Prometheus cone is constrained in a chute between steep older lava flows.
5/7/2009 15:38:51	-15.09420	-173.74832	1554	191	5	1175	Older lavas appear brown and are covered with black sand.
5/7/2009 15:40:27	-15.09421	-173.74845	1557	157	5	1177	Older lavas are piles of elongate pillows draping steep slope
5/7/2009 15:41:35	-15.09431	-173.74850	1559	152	9	1180	Some white staining on rocks.
5/7/2009 15:42:34	-15.09442	-173.74852	1561	153	5	1180	Thick layer of black sand here
5/7/2009 15:45:34	-15.09450	-173.74848	1565	40	2	1181	Shimmering fluids here. Settling down at **Red Rock Ridge**. Rocks with red and white deposits.
5/7/2009 15:46:00	-15.09450	-173.74848	1566	40	3	1181	At Red Rock Ridge - ***we are offset about 10m NE***.
5/7/2009 15:46:15	-15.09450	-173.74848	1568	40	3	1181	Settling into a good spot for fluid sampling.
5/7/2009 15:46:56	-15.09450	-173.74849	1569	39	3	1181	Removing weight.
5/7/2009 15:47:58	-15.09449	-173.74849	1571	40	3	1181	Flowery-looking bacterial slime swaying from rocks.
5/7/2009 15:48:15	-15.09449	-173.74850	1573	40	3	1181	Getting fluid sampler ready to sample.
5/7/2009 15:48:59	-15.09449	-173.74850	1574	40	3	1181	Julie thinks this is almost exactly where Rick's slurp sample was taken.
5/7/2009 15:49:29	-15.09449	-173.74850	1576	41	3	1181	Red staining on rocks. White staining and bacterial goop too.
5/7/2009 15:49:55	-15.09448	-173.74850	1577	40	3	1181	Fluid sampler wand in hand.
5/7/2009 15:51:11	-15.09448	-173.74850	1580	41	3	1181	Temperature is 7 and climbing. Wait to see where it goes.
5/7/2009 15:52:26	-15.09448	-173.74850	1582	42	3	1181	Knocked off orange stuff stuck on end of wand.
5/7/2009 15:52:43	-15.09448	-173.74850	1583	42	3	1181	Placing sampling end back in hole. 7 degrees and climbing.
5/7/2009 15:54:24	-15.09449	-173.74850	1586	42	3	1181	SAMPLE Fluid 24. **J414-HFS-24**. Shimmering water. Z=1182m. **(Red Rock Ridge)**
5/7/2009 15:55:01	-15.09449	-173.74850	1587	42	3	1181	24. J414-HFS-24 cont. Looking for warmer temperatures.
5/7/2009 16:00:23	-15.09449	-173.74850	1594	43	2	1181	24. J414-HFS-24. Temp=14 and still rising. pH around 3 and decreasing.
5/7/2009 16:01:51	-15.09449	-173.74850	1596	43	2	1181	24. J414-HFS-24 cont. Starting Filtered bag #16 at 160147.
5/7/2009 16:02:47	-15.09449	-173.74850	1598	43	2	1181	24. J414-HFS-24 cont. 15 5.670 S. 173 44.910 W. Red Rock Ridge. 1182m.
5/7/2009 16:03:42	-15.09449	-173.74850	1600	43	2	1181	24. J414-HFS-24 cont. Not seeing exhaust.
5/7/2009 16:05:01	-15.09448	-173.74850	1602	43	2	1181	24. J414-HFS-24 cont. Sample stopped 160435. Tmax=16.8 Tavg=16.4 vol=500ml.
5/7/2009 16:06:12	-15.09448	-173.74850	1605	43	2	1181	SAMPLE Fluid 25. **J414-HFS-25**. Unfiltered bag #21. Started 160540. Same spot as sample J414-HFS-24. (**Red Rock Ridge)**
5/7/2009 16:06:47	-15.09448	-173.74850	1606	43	2	1181	J414-HFS-25 cont. pump stuck but started again so it's OK.
5/7/2009 16:09:56	-15.09450	-173.74850	1610	43	2	1181	J414-HFS-25 cont. Stopped 160935. Tmax=17.4 Tavg=17.0 Vol=600ml.
5/7/2009 16:11:09	-15.09450	-173.74850	1613	43	2	1181	SAMPLE Fluid 26. **J414-HFS-26**. Filter #10. Same spot as samples 24 and 25. Started 161053. **(Red Rock Ridge)**
5/7/2009 16:14:36	-15.09449	-173.74850	1617	43	2	1181	26. J414-HFS-26 cont. Sample will take approx 15 min.
5/7/2009 16:22:01	-15.09449	-173.74850	1625	42	3	1181	26. J414-HFS-26 cont. Stopped 162133. Tmax=18.4 Tavg=17.7 Vol=2 liters.
5/7/2009 16:23:50	-15.09450	-173.74849	1628	40	3	1181	Checking pH again; about 2.7
5/7/2009 16:24:02	-15.09450	-173.74849	1629	41	3	1181	Done fluid sampling. Removing probe.
5/7/2009 16:24:36	-15.09450	-173.74849	1631	42	2	1181	Big rock rolled downslope as probe was removed.
5/7/2009 16:25:13	-15.09449	-173.74849	1633	42	2	1182	Storing fluid sampler probe. Will try to get a sample of rock with red crust on it.
5/7/2009 16:29:09	-15.09448	-173.74850	1638	43	2	1182	Fluid sampler probe is back in basket.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 16:34:14	-15.09449	-173.74850	1644	44	3	1181	Still securing fluid sampler probe in basket.
5/7/2009 16:36:44	-15.09449	-173.74850	1647	44	3	1181	SAMPLE Geology 27. **J414-rock-27**. Want to get a rock with red crust on it. Same location as fluid samples 24-26. **(Red Rock Ridge)**
5/7/2009 16:38:16	-15.09449	-173.74849	1650	41	3	1181	27. J414-rock-27 cont. Opening port Biobox to put selected rock into. Choosing a rock.
5/7/2009 16:40:27	-15.09449	-173.74849	1653	46	3	1181	27. J414-rock-27 cont. Broke a piece of rock off with red crust. Placed in Port Bio box.
5/7/2009 16:40:55	-15.09449	-173.74849	1654	45	3	1181	27. J414-rock-27 cont. Rock sample is for Rick Davis and others.
5/7/2009 16:41:32	-15.09451	-173.74850	1656	44	5	1181	Backing away from Red Rock Ridge. Will head to Hades next for observations then pick up hydrophone.
5/7/2009 16:42:45	-15.09451	-173.74850	1658	45	4	1181	It is 40m SW to get to Hades.
5/7/2009 16:43:51	-15.09451	-173.74851	1660	46	5	1181	Adjusting fluid sampler probe.
5/7/2009 16:45:10	-15.09454	-173.74850	1663	45	4	1183	Jason heading is 045. Moving southwest to Hades.
5/7/2009 16:49:10	-15.09463	-173.74858	1668	46	3	1191	SAMPLE Fluid 28. **J414-HFS-28**. Background water sample. Filtered bag #17. Started at 164848. 1193m. **(While moving away from Red Rock Ridge towards Hades)**
5/7/2009 16:50:33	-15.09464	-173.74866	1670	25	1	1188	J414-HFS-28 cont. May not be background since pH is still reading 3.
5/7/2009 16:51:58	-15.09464	-173.74890	1672	275	9	1190	J414-HFS-28 cont. Stopped 165144. We are at Hades already.
5/7/2009 16:52:21	-15.09465	-173.74895	1674	274	2	1189	J414-HFS-28 cont. Note correction in sample name.
5/7/2009 16:53:15	-15.09472	-173.74910	1676	273	14	1189	J414-HFS-28 cont. Correct sample name should be J414-HFS-28.
5/7/2009 16:53:49	-15.09476	-173.74914	1677	89	22	1189	In plume over **Hades.** Seeing temperature anomaly about 1 degree at 15 meters above seafloor.
5/7/2009 16:53:56	-15.09477	-173.74914	1678	88	19	1190	Heading to seafloor for observations.
5/7/2009 16:55:05	-15.09479	-173.74910	1680	87	3	1200	Seafloor in view.
5/7/2009 16:55:17	-15.09479	-173.74909	1682	87	2	1200	Looking for vent.
5/7/2009 16:56:03	-15.09478	-173.74911	1683	83	2	1202	Passing marker with hydrophone. Hydrophone has small amount of sand on top.
5/7/2009 16:56:18	-15.09478	-173.74911	1685	88	2	1201	Hydrophone looks fine.
5/7/2009 16:57:00	-15.09476	-173.74913	1686	88	4	1201	Lots of big round pillows with pyroclastic sand on top. Staining. Fish.
5/7/2009 16:58:29	-15.09467	-173.74908	1689	87	4	1206	Fresh lava tubes overlying older more stained lava pillows.
5/7/2009 16:58:54	-15.09463	-173.74904	1690	89	7	1207	Visibility is decreasing.
5/7/2009 16:59:38	-15.09461	-173.74901	1692	41	3	1208	Can see glow of lava on seafloor.
5/7/2009 17:00:00	-15.09460	-173.74903	1693	46	5	1207	Glowing along long length of fissure.
5/7/2009 17:00:23	-15.09462	-173.74905	1695	43	2	1206	Large pillow forming along fissure.
5/7/2009 17:00:35	-15.09462	-173.74904	1696	48	2	1206	Visibility is low.
5/7/2009 17:01:09	-15.09459	-173.74900	1698	39	2	1205	Lots of ash flying around in front of cameras.
5/7/2009 17:02:08	-15.09465	-173.74897	1700	65	5	1204	Vent is flashing red with explosions.
5/7/2009 17:02:24	-15.09465	-173.74897	1701	68	5	1203	Jason is in thick plume.
5/7/2009 17:02:55	-15.09466	-173.74898	1702	66	3	1204	Need to approach from a different angle.
5/7/2009 17:04:48	-15.09465	-173.74903	1705	63	6	1204	Can see flashes in Medea camera.
5/7/2009 17:05:02	-15.09463	-173.74905	1706	68	10	1204	Jason is enveloped in plume. Visibility low.
5/7/2009 17:05:29	-15.09460	-173.74906	1708	124	14	1204	Using view in Medea camera to get better view of vent.
5/7/2009 17:06:08	-15.09457	-173.74902	1710	152	9	1206	Flow on right side of cone while vent at top of cone is flashing and exploding.
5/7/2009 17:06:14	-15.09457	-173.74901	1711	153	8	1207	**Hades** is more active than yesterday.
5/7/2009 17:06:29	-15.09456	-173.74899	1712	162	5	1207	Huge block just collapsed from top of cone.
5/7/2009 17:06:41	-15.09455	-173.74898	1713	163	6	1206	Side of cone is sliding away.
5/7/2009 17:08:12	-15.09454	-173.74897	1716	172	5	1205	This is enormously effusive. Whole top of cone is unstable and sliding with molten lava and explosions pushing blocky lava out of the way and downslope.
5/7/2009 17:08:26	-15.09454	-173.74897	1717	174	5	1205	Seems to be pulling apart as a whole sheet.
5/7/2009 17:08:49	-15.09454	-173.74898	1718	174	5	1205	"This is the Real Deal" Dave Clague.
5/7/2009 17:09:43	-15.09454	-173.74900	1720	176	7	1205	Huge blocks are breaking off top of cone and being tossed downslope.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 17:10:28	-15.09453	-173.74901	1722	174	4	1205	Blowing large bubbles of glass about 1 meter diameter out of vent.
5/7/2009 17:11:07	-15.09452	-173.74893	1724	172	4	1205	Can see flow coming out of base. Then pressure builds and the whole things explodes.
5/7/2009 17:12:19	-15.09451	-173.74890	1726	195	1	1206	Basically a glowing avalanche coming off side of cone. Large chunks from top being carried downslope on fluid flow.
5/7/2009 17:14:44	-15.09452	-173.74893	1729	192	1	1205	Whole side of cone is molten lava beneath and slides downslope. Side of cone begins to slide away then lava explodes out.
5/7/2009 17:15:25	-15.09453	-173.74893	1731	193	2	1206	Pillows break up immediately upon emerging.
5/7/2009 17:15:56	-15.09453	-173.74893	1732	190	2	1205	Whole side is molten lava with crust on top sliding downslope.
5/7/2009 17:17:42	-15.09452	-173.74893	1735	188	4	1203	Big blasts at top of cone as side slides away. Activity is vigorous!
5/7/2009 17:19:14	-15.09454	-173.74896	1738	178	5	1204	There is less than 45 seconds between bursts.
5/7/2009 17:20:06	-15.09453	-173.74896	1739	178	5	1205	Major avalanche.
5/7/2009 17:21:04	-15.09453	-173.74897	1741	178	4	1205	Jason is sitting about 5-6 meters from wall that is flowing downslope.
5/7/2009 17:21:34	-15.09453	-173.74899	1743	176	5	1206	Want to move downslope to see where flow is going.
5/7/2009 17:23:55	-15.09449	-173.74902	1747	139	5	1216	Pillows forming
5/7/2009 17:24:01	-15.09449	-173.74902	1748	138	4	1216	Pillows expanding
5/7/2009 17:24:13	-15.09449	-173.74902	1750	138	4	1216	Pillow growing
5/7/2009 17:25:08	-15.09449	-173.74903	1752	118	5	1216	Pillow cracking with molten lava expanding and continuing to flow.
5/7/2009 17:25:40	-15.09449	-173.74903	1753	118	5	1216	Not a lot of steam coming off pillow at crack where molten lava is visible. But some is there.
5/7/2009 17:26:48	-15.09449	-173.74903	1755	117	4	1217	Growing pillow we are watching is at 1216m - 10m below main eruption.
5/7/2009 17:28:41	-15.09448	-173.74904	1758	118	4	1217	Watching pillow progress downslope.
5/7/2009 17:29:39	-15.09448	-173.74905	1760	127	7	1217	Lava is pouring downslope still.
5/7/2009 17:30:12	-15.09447	-173.74905	1762	182	4	1217	Darn! time to go get the hydrophone.
5/7/2009 17:30:24	-15.09448	-173.74905	1763	194	4	1217	NAV Doppler reset
5/7/2009 17:32:01	-15.09469	-173.74913	1765	195	5	1204	Moving back upslope to go get hydrophone.
5/7/2009 17:33:15	-15.09477	-173.74906	1768	93	2	1200	Back at hydrophone.
5/7/2009 17:34:00	-15.09478	-173.74904	1769	52	2	1200	Not a lot of sand on top of hydrophone.
5/7/2009 17:35:56	-15.09478	-173.74902	1772	47	1	1200	Picking up hydrophone 173535. Placing in port box. **[Jason target info: Hydrophone-Mkr-147. 15.094873S 173.749138W. Z=1199.]**
5/7/2009 17:37:12	-15.09476	-173.74901	1775	47	1	1200	Picking up marker. Placing in port box.
5/7/2009 17:40:58	-15.09476	-173.74903	1779	51	2	1200	Box swung back in place.
5/7/2009 17:41:18	-15.09476	-173.74905	1781	52	3	1199	Want to get a scoop of pyroclastic sands near vent.
5/7/2009 17:41:50	-15.09476	-173.74907	1782	52	3	1201	Heading back to Hades.
5/7/2009 17:46:45	-15.09457	-173.74905	1788	81	15	1206	Large round ring could be seen in Medea cam behind Jason. Quite large and quite round but could not see it in aft cam.
5/7/2009 17:47:39	-15.09455	-173.74901	1790	114	8	1206	Lava is extruding in vent. Big blocks avalanching downslope.
5/7/2009 17:47:52	-15.09455	-173.74900	1791	114	7	1205	Picking a spot to collect a scoop sample.
5/7/2009 17:50:28	-15.09452	-173.74895	1795	100	6	1207	Looking for sand. Most stuff near vent is larger than what Dave wants.
5/7/2009 17:52:38	-15.09455	-173.74896	1798	155	6	1205	Rock pieces with red-hot edges are falling past Jason.
5/7/2009 17:54:50	-15.09462	-173.74898	1801	137	4	1206	SAMPLE Fluid 29. **J414-niskin-29**. Niskin bottle. 1204 m. **(Hades)**
5/7/2009 17:56:16	-15.09465	-173.74895	1804	129	12	1187	SAMPLE Fluid 30. **J414-niskin-30**. Second Niskin fired - white fired first (forward). **(Hades)**
5/7/2009 17:56:57	-15.09467	-173.74894	1805	129	28	1168	JASON off bottom
5/7/2009 17:57:06	-15.09476	-173.74890	1806	130	32	1164	Time to come up.
5/7/2009 17:57:16	-15.09476	-173.74891	1808	129	36	1160	Rising through plume.
5/7/2009 17:58:45	-15.09483	-173.74884	1809	137	49	1153	Plume still present at 1154 m.
5/7/2009 18:00:09	-15.09484	-173.74884	1810	156	80	1123	Still in plume at 1125m.
5/7/2009 18:01:11	-15.09484	-173.74884	1811	164	111	1100	Still in plume at 1100 m.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J414 log comments (West Mata)
5/7/2009 18:01:45	-15.09484	-173.74884	1812	163	116	1085	Mostly out of plume at 1090 m.
5/7/2009 18:55:28	-15.09472	-173.74878	1813	179	183	2	Medea on deck.
5/7/2009 19:02:13	-15.09463	-173.74880	1814	163	196	1	JASON on deck.

J2-415 Dive Log

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 05:47:12						2	JASON in water
2009/05/08 05:48:19						2	Quite a strong current in this area.
2009/05/08 05:49:05						2	Tasks J415: Find fresh lava flows and hydrothermal vents along track line.
2009/05/08 05:49:39						2	Tasks cont. Collect rocks sands and macrobiology.
2009/05/08 05:49:52						3	Tasks cont. Find vents and conduct sampling.
2009/05/08 05:50:00						3	Tasks cont. Deploy markers.
2009/05/08 05:50:09						3	Medea in the water.
2009/05/08 05:50:45						3	Tools J415: Multi-chamber suction sampler. 2 scoop bags.
2009/05/08 05:51:06						8	Tools cont. 2 gas tights. 2 major samplers.
2009/05/08 05:51:30						13	On all dives: Niskins; Jason temp probe; LSS sensor; DSC.
2009/05/08 05:53:48						38	Waypoints R415: Landing point; top of south ridge; near temp anom; cast09 temp anom; top of central ridge; Nautilus vent; ridge saddle; north ridge; end.
2009/05/08 06:54:52						1653	WATCHSTANDERS Susan Merle logger Rick Davis video. Joe Resing is in the hot seat.
2009/05/08 06:58:43						1653	We will be starting at the southern end of the northern NELSC and moving up the ridge crest over the eruptive (?) area.
2009/05/08 07:12:50						1669	Ambient temp = 2.7
2009/05/08 07:13:16						1677	Bottom in sight.
2009/05/08 07:13:24	-15.390945	-174.252480	1839	105	5	1677	JASON on bottom
2009/05/08 07:13:37	-15.390944	-174.252480	1840	105	5	1677	No sample taken.
2009/05/08 07:14:11	-15.390944	-174.252481	1841	105	5	1676	VIDEO Start recording HDCam
2009/05/08 07:14:46	-15.390945	-174.252484	1843	106	5	1677	Lava covered bottom. No sediments.
2009/05/08 07:14:53	-15.390943	-174.252485	1844	104	5	1677	No loose rocks.
2009/05/08 07:15:11	-15.390946	-174.252488	1845	105	6	1676	Searching for rocks for Rubin sampling.
2009/05/08 07:15:52	-15.390952	-174.252498	1847	105	5	1677	Depth=1678 Alt=4.1
2009/05/08 07:16:14	-15.390952	-174.252500	1848	105	5	1677	Dropping two weights.
2009/05/08 07:17:34	-15.390951	-174.252499	1851	174	3	1677	Looking for piece to break off bottom
2009/05/08 07:17:58	-15.390961	-174.252496	1852	175	2	1678	Pillow with some possible hydrothermal staining.
2009/05/08 07:18:38	-15.390958	-174.252497	1854	174	2	1678	Very fresh lava flow.
2009/05/08 07:21:56	-15.390940	-174.252497	1858	172	1	1678	SAMPLE Geology **J415-rock-01**. Geo sample broken from bottom. Depth=1679m Alt = 1.5. Taking picture of sample. It is a shelly lobate crust 15 cm long very fresh. **[landing site - NW (and downslope) of ridgecrest]**
2009/05/08 07:22:41	-15.390940	-174.252497	1860	173	1	1679	J415-rock-01 cont geo box 1. Lat 15 23.456'S Long 174 15.150'W from LBL
2009/05/08 07:23:32	-15.390976	-174.252495	1862	173	5	1673	J415-rock-01 cont. Sample collected for Rubin.
2009/05/08 07:24:08	-15.391005	-174.252497	1863	151	5	1673	Moving to top of south ridge.
2009/05/08 07:25:20	-15.391044	-174.252437	1866	156	3	1671	Bottom covered with fresh lava.
2009/05/08 07:25:46	-15.391049	-174.252430	1867	154	3	1671	Biology -- large with fish.
2009/05/08 07:26:18	-15.391062	-174.252445	1868	155	4	1670	More fresh pillows with some black sediment coating.
2009/05/08 07:26:54	-15.391059	-174.252445	1870	157	4	1671	Yellow stains on pillows.
2009/05/08 07:28:00	-15.391077	-174.252446	1872	161	5	1668	Sheet lava rendered blocky and tortured. Possible channel flow.
2009/05/08 07:28:19	-15.391086	-174.252442	1874	162	4	1668	Looks like a huge collapsed tube.
2009/05/08 07:29:37	-15.391097	-174.252453	1876	164	4	1666	Pillow sitting in the middle of big jumbled flow with some Fe coating. Breadcrust texture.
2009/05/08 07:30:33	-15.391157	-174.252446	1878	164	4	1661	Shelly lobate flows.
2009/05/08 07:30:59	-15.391183	-174.252419	1879	168	2	1662	Shelly lobate flows on a steep slope.
2009/05/08 07:31:28	-15.391209	-174.252398	1881	170	2	1662	Taking images at a rate of one per minute.
2009/05/08 07:32:50	-15.391201	-174.252336	1883	159	3	1660	Approaching ridge crest. Sheet flow folded up at the end. Sediment increasing as approaching ridge crest.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 07:33:23	-15.391189	-174.252315	1885	159	4	1659	Pillow with a very high sheen. Slope is shallowing.
2009/05/08 07:34:35	-15.391245	-174.252226	1887	160	6	1651	Fragmental lava.
2009/05/08 07:34:43	-15.391254	-174.252220	1888	161	5	1652	VIDEO Stop recording HDCam
2009/05/08 07:34:50	-15.391259	-174.252216	1889	160	3	1652	VIDEO Start recording HDCam
2009/05/08 07:34:59	-15.391259	-174.252214	1890	160	3	1652	New HD tape.
2009/05/08 07:35:49	-15.391282	-174.252198	1892	161	1	1652	Outcrop very spattery or a spatter rampart. High sediments in deposit.
2009/05/08 07:36:23	-15.391317	-174.252219	1894	230	1	1655	Biology -- shrimp.
2009/05/08 07:37:34	-15.391364	-174.252297	1896	231	4	1655	Large pile a spatter rampart.
2009/05/08 07:38:35	-15.391405	-174.252334	1898	227	4	1653	Biology -- large jelly?
2009/05/08 07:39:33	-15.391463	-174.252323	1900	173	4	1655	Poor visibility. Depth=1653 Alt=3.7
2009/05/08 07:40:27	-15.391477	-174.252245	1902	178	1	1660	Hydrothermal staining. Current is clearing water.
2009/05/08 07:41:40	-15.391456	-174.252192	1904	188	1	1661	Large collapse. Classic lobate shelly crust void beneath.
2009/05/08 07:42:28	-15.391458	-174.252177	1906	188	2	1660	Small dusting of sediment. Going to attempt to grasp piece of shell.
2009/05/08 07:44:31	-15.391436	-174.252167	1909	187	1	1660	SAMPLE Geology **J415-rock-02**. Depth=1661.6 Alt=0.7 Lat 15 23.487'S Long 174 15.131'W. For Rubin. Crust of a collapsed lobate 8 cm long. **[NW slope of ridge]**
2009/05/08 07:45:03	-15.391437	-174.252168	1910	187	1	1661	J415-rock-2 cont. Glass on upper and lower surface. Going into Box 2.
2009/05/08 07:45:52	-15.391461	-174.252155	1912	188	1	1660	Large stained rock. Very clear water compared to earlier.
2009/05/08 07:46:22	-15.391513	-174.252146	1914	151	2	1660	Abundant hydrothermal staining.
2009/05/08 07:47:50	-15.391587	-174.252134	1916	148	1	1661	Water is clouding up. Folded surface of a sheet creating a narrow channel.
2009/05/08 07:48:56	-15.391623	-174.252113	1919	148	1	1663	Large piles of sand and rubble. Relatively flat. Rubin observation: looks older compared to earlier.
2009/05/08 07:50:15	-15.391623	-174.252071	1921	78	1	1662	Biology -- anemone.
2009/05/08 07:51:52	-15.391611	-174.252057	1924	79	1	1662	SAMPLE Geology **J415-rock-03** Depth=1662 Alt=1 Lat 15 23.500'S Long 174 15.122'W for Rubin. **[NW slope of ridge]**
2009/05/08 07:53:55	-15.391605	-174.252062	1927	81	1	1662	J2415-Rock-03 cont. Picked out of rubble pile. Crust from a jumbled chaotic sheet texture. Long and thin. 10 cm. Very glassy. Very fresh. Box 3. Lots of volcaniclastic sediment - absent at last site.
2009/05/08 07:54:51	-15.391609	-174.252068	1929	81	1	1662	Taking pictures of anemone. 10 cm long pink and red.
2009/05/08 07:56:50	-15.391651	-174.252003	1931	141	1	1662	Biology -- Seastar Reisingid found among debris on ridge.
2009/05/08 07:57:51	-15.391658	-174.251983	1932	143	1	1663	Seastar called Breisingid not Reisingid.
2009/05/08 07:58:46	-15.391751	-174.251900	1934	145	1	1667	Lava still has a fresh look.
2009/05/08 08:00:26	-15.391823	-174.251852	1937	158	1	1667	Biology -- possible sponge.
2009/05/08 08:01:19	-15.391848	-174.251897	1938	117	2	1667	Young block lava lapping onto older rock. Biology: 3 corals.
2009/05/08 08:01:54	-15.391857	-174.251909	1940	109	3	1667	Sampling older looking rock among the fresher lava.
2009/05/08 08:04:20	-15.391826	-174.251889	1944	174	1	1668	SAMPLE Geology **J415-rock-04** Z=1667 Alt=0.5 Lat 15 23.514'S Long 174 15.110'W. For Rubin broken from kipuka. **[NW slope of ridge]**
2009/05/08 08:07:11	-15.391827	-174.251862	1947	174	1	1668	J2415-Rock-04 cont. Sample is very friable. Kicking up ton sediment during collection.
2009/05/08 08:08:47	-15.391831	-174.251859	1950	172	1	1668	J2415-Rock-04 cont. Geobox #4. Older lava from a small upstanding ridge several meters high.
2009/05/08 08:09:58	-15.391841	-174.251863	1952	173	1	1668	Poking at bottom with claw and found the bottom to be sandy.
2009/05/08 08:10:23	-15.391838	-174.251866	1954	171	1	1668	Moving towards top of ridge.
2009/05/08 08:11:33	-15.391848	-174.251843	1956	148	3	1665	Rubin is moving to hot seat.
2009/05/08 08:12:11	-15.391846	-174.251834	1957	147	3	1665	Heading 146.6
2009/05/08 08:13:12	-15.391833	-174.251838	1959	148	3	1665	Dropping two weights. Lat 15 23.515'S Long 174 15.107'W.
2009/05/08 08:14:25	-15.391907	-174.251755	1962	147	4	1660	Underway moving over very thin jumbled sheets. Small collapse feature with some striations on flow.
2009/05/08 08:14:54	-15.391950	-174.251705	1963	150	4	1657	Another kipuka.
2009/05/08 08:15:39	-15.392070	-174.251626	1965	150	7	1650	Moving over small escarpment. Older pillows sticking out over younger thin lava.
2009/05/08 08:16:05	-15.392106	-174.251588	1966	149	5	1649	Curtain folded sheets with some biology.
2009/05/08 08:16:33	-15.392123	-174.251571	1968	150	4	1648	Vase sponge. Brittle star.
2009/05/08 08:17:39	-15.392190	-174.251581	1970	126	5	1646	Still moving over small kipukas. Stalked crinoid on high standing pillow.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 08:17:51	-15.392204	-174.251584	1971	124	4	1646	Brittle stars on corals.
2009/05/08 08:19:11	-15.392221	-174.251555	1973	140	3	1646	Taking pictures of stalked crinoid.
2009/05/08 08:19:54	-15.392269	-174.251528	1975	148	4	1644	Seastar. Large pink coral.
2009/05/08 08:20:35	-15.392289	-174.251533	1977	146	2	1643	Coral could be as old as 100 years indicating lava age. Some young spatter observed.
2009/05/08 08:21:43	-15.392289	-174.251541	1979	146	3	1642	Several brittle stars different species. A large pile of shelf wall.
2009/05/08 08:22:34	-15.392306	-174.251527	1981	146	3	1641	Biology -- vase sponge.
2009/05/08 08:23:15	-15.392322	-174.251518	1982	155	2	1641	Old jumbled rock with younger volcaniclast sitting on top.
2009/05/08 08:24:03	-15.392416	-174.251466	1984	153	2	1644	Older sheet flow with a dusting of black sediment.
2009/05/08 08:24:36	-15.392427	-174.251453	1986	153	2	1645	Biology - small coral.
2009/05/08 08:25:34	-15.392432	-174.251458	1988	153	1	1646	Previous biology not coral but sea pen.
2009/05/08 08:26:44	-15.392427	-174.251436	1990	197	2	1645	Observing black sediment. Moving on. A large collapse in older material. Whip corals.
2009/05/08 08:27:54	-15.392454	-174.251405	1992	167	3	1644	Biology -- more corals.
2009/05/08 08:28:40	-15.392444	-174.251386	1994	166	4	1644	Terrain more jumbled older material.
2009/05/08 08:29:18	-15.392491	-174.251378	1995	166	4	1642	Rubin estimates date of older material to several decades and Embley agrees.
2009/05/08 08:30:52	-15.392656	-174.251284	1998	171	3	1643	Large collapsed shelly sheet flow with volcaniclastic sediment. More sea pens and whip corals.
2009/05/08 08:31:25	-15.392713	-174.251263	2000	169	2	1643	Chaotic sheet. Vase sponge.
2009/05/08 08:32:25	-15.392740	-174.251262	2002	169	2	1643	**Changing course and now moving along the ridge crest to the next way point "NearTemperature Anom".**
2009/05/08 08:34:51	-15.392683	-174.251148	2005	20	2	1644	Heading=027 Ambient T=2.8 Older sheet looks less chaotic.
2009/05/08 08:36:15	-15.392550	-174.251142	2007	25	3	1646	Morphology of older material has become more coherent as Jason moves up the ridge.
2009/05/08 08:36:43	-15.392519	-174.251138	2009	25	2	1646	Observing upper surface of lobate crust. Corals.
2009/05/08 08:37:29	-15.392479	-174.251131	2011	28	2	1646	At the edge of a collapse in the older material. Vase sponge.
2009/05/08 08:38:14	-15.392445	-174.251117	2012	28	2	1646	Biology -- coral.
2009/05/08 08:38:50	-15.392440	-174.251117	2014	32	1	1647	Pressure ridges on surface of sheet.
2009/05/08 08:39:31	-15.392433	-174.251112	2016	31	1	1647	Taking pictures of coral which has a brittle star.
2009/05/08 08:40:08	-15.392397	-174.251101	2017	33	3	1646	Moving up pressure ridge.
2009/05/08 08:41:46	-15.392289	-174.251075	2020	35	2	1648	Biology -- vase sponge corals. Lots of corals. Whips.
2009/05/08 08:42:14	-15.392293	-174.251074	2021	38	1	1649	Moved off pressure ridge.
2009/05/08 08:42:47	-15.392265	-174.251049	2023	36	3	1647	Biology -- sponges.
2009/05/08 08:43:23	-15.392264	-174.251046	2024	36	1	1649	Hackly sheet surface in the old lava.
2009/05/08 08:43:50	-15.392259	-174.251047	2026	36	2	1648	Lava peppered with corals.
2009/05/08 08:45:00	-15.392174	-174.251000	2028	28	2	1650	Younger volcanic sand debris on older lava.
2009/05/08 08:45:49	-15.392105	-174.250981	2030	24	3	1650	Transitioning into more lobate structure. Collapse in lobe with a shelly surface.
2009/05/08 08:46:14	-15.392085	-174.250964	2031	24	2	1651	Biology - whip.
2009/05/08 08:47:11	-15.392076	-174.250944	2033	29	2	1651	Semi-polygonal shapes on the edge of the crust.
2009/05/08 08:47:43	-15.392036	-174.250932	2035	29	2	1651	Biology -- coral. Still following lobate approaching contact.
2009/05/08 08:48:55	-15.391975	-174.250906	2037	29	2	1651	Hydrothermal staining in a crack in a lobate surface. More black sediment.
2009/05/08 08:49:57	-15.391940	-174.250867	2039	29	3	1651	Biology -- coral.
2009/05/08 08:50:33	-15.391935	-174.250815	2041	323	2	1651	Flow most likely sourced from the ridge on the SE.
2009/05/08 08:50:52	-15.391924	-174.250804	2042	325	2	1652	Biology -- crinoid.
2009/05/08 08:51:33	-15.391891	-174.250785	2044	43	3	1653	Old lobate shelly surface collapsed in places.
2009/05/08 08:52:26	-15.391820	-174.250782	2045	342	4	1652	Lobate flow seems to be fresher.
2009/05/08 08:52:39	-15.391813	-174.250773	2047	344	4	1652	High-standing older looking material.
2009/05/08 08:53:05	-15.391804	-174.250734	2048	15	3	1653	In a collapse pit.
2009/05/08 08:54:05	-15.391786	-174.250740	2050	26	1	1654	Low lying lobate flow young lava.
2009/05/08 08:54:39	-15.391786	-174.250736	2052	6	3	1653	Fairly shelly looking lobate.
2009/05/08 08:56:11	-15.391575	-174.250755	2054	24	3	1655	Young flow lobate lots of pyroclastic material sitting on top.
2009/05/08 08:56:26	-15.391547	-174.250748	2055	28	3	1656	Biology -- whips.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 08:57:17	-15.391471	-174.250731	2057	138	5	1659	Flat flow uncollapsed with small kipukas poking through.
2009/05/08 08:57:59	-15.391466	-174.250706	2059	153	4	1659	Older pillows among younger lava.
2009/05/08 08:58:10	-15.391465	-174.250697	2060	133	4	1659	Older flow has pillow forms here.
2009/05/08 09:00:35	-15.391329	-174.250673	2064	41	2	1662	Biology -- vase coral. Younger coherent lobate.
2009/05/08 09:02:04	-15.391206	-174.250701	2066	8	2	1662	Biology -- coral vase sponge.
2009/05/08 09:03:05	-15.391203	-174.250712	2068	8	1	1663	Taking pictures of starfish.
2009/05/08 09:03:31	-15.391204	-174.250712	2070	8	1	1662	Flow is becoming a little more chaotic.
2009/05/08 09:04:09	-15.391142	-174.250713	2071	24	3	1661	Biology - sponge. Lobates.
2009/05/08 09:04:34	-15.391086	-174.250688	2073	24	2	1659	Lobates with blackish sediment dusting it.
2009/05/08 09:05:28	-15.390985	-174.250660	2074	25	3	1658	Biology - coral.
2009/05/08 09:08:16	-15.390807	-174.250667	2078	44	1	1659	Ropey flow here and little corals. Looks like some sponges here.
2009/05/08 09:08:44	-15.390802	-174.250665	2080	45	1	1659	Intermediate age material. Chaotic lavas. Probably formed here and are coming closer to the vent.
2009/05/08 09:09:37	-15.390785	-174.250640	2082	47	5	1655	This is an older flow.
2009/05/08 09:10:01	-15.390757	-174.250618	2083	49	4	1655	It's some type of a rattail ahead of us.
2009/05/08 09:10:42	-15.390713	-174.250562	2085	52	3	1654	Quite a pretty rattail with larger fins.
2009/05/08 09:11:06	-15.390705	-174.250511	2086	55	3	1654	It looks like it is flying with "wings".
2009/05/08 09:11:16	-15.390703	-174.250503	2087	34	2	1654	Chaotic medium-age lavas in front of us.
2009/05/08 09:12:54	-15.390680	-174.250500	2090	36	3	1653	Bob picked the landing site pretty well. Birthday gift for him was coming down on the 2008 lava flow.
2009/05/08 09:13:33	-15.390683	-174.250495	2092	36	2	1653	Not sure what age the lavas were that we landed upon.
2009/05/08 09:14:27	-15.390639	-174.250481	2093	36	3	1651	Still seeing the "hackly" lavas. Look like pressure ridges that we are passing over.
2009/05/08 09:15:46	-15.390515	-174.250497	2096	30	3	1656	Now looking at a more low-lying flatter lobate flow beneath us.
2009/05/08 09:17:46	-15.390318	-174.250443	2099	20	1	1658	Discussing taking another sample. Could be within the last century or younger - calling it "intermediate age".
2009/05/08 09:19:09	-15.390300	-174.250434	2101	20	1	1658	SAMPLE Geology 5. **J415-rock-05**. Crumbly rock that keeps breaking apart when Jason grabs it. Trying again.
2009/05/08 09:19:45	-15.390300	-174.250429	2103	20	1	1658	J415-rock-05 cont. Piece of push up structure at edge of this hackly sheet. Friable. Into box 5.
2009/05/08 09:20:37	-15.390300	-174.250418	2105	19	2	1657	J415-rock-05 cont. Lat 15 23.419'S Long 174 15.026'W. Z=1658m
2009/05/08 09:21:21	-15.390232	-174.250409	2106	23	2	1657	J415-rock-05 cont. A little more than 200m north of the last sample along the ridge.
2009/05/08 09:21:56	-15.390209	-174.250394	2108	24	2	1657	Looks like we may have come across the **contact**.
2009/05/08 09:22:05	-15.390207	-174.250393	2109	24	1	1657	This is a newer flow all of a sudden.
2009/05/08 09:22:25	-15.390197	-174.250389	2110	26	1	1657	This material could have been dammed up against the older flow.
2009/05/08 09:23:14	-15.390175	-174.250388	2112	24	2	1656	Yellow staining on these rocks. Orang-ish-yellow staining.
2009/05/08 09:23:40	-15.390154	-174.250425	2114	25	2	1655	Not seeing the animals that we saw earlier. "Back in black" lavas with staining.
2009/05/08 09:24:13	-15.390154	-174.250446	2115	25	1	1656	An occasional shrimp swimming around.
2009/05/08 09:24:39	-15.390143	-174.250445	2117	26	1	1656	Lavas are sort of lobate younger lavas. Not much sediment or organisms.
2009/05/08 09:26:39	-15.390073	-174.250390	2120	37	2	1654	This is starting to get a little bit chaotic.
2009/05/08 09:26:59	-15.390055	-174.250371	2121	36	1	1654	Looking pretty shiny here.
2009/05/08 09:27:45	-15.390049	-174.250337	2123	10	1	1654	Looking at white staining on the rims of some of these lavas.
2009/05/08 09:28:18	-15.390011	-174.250303	2124	22	3	1653	Nice fresh black lava. Lower-lying lobates.
2009/05/08 09:28:52	-15.389991	-174.250284	2126	22	2	1653	Nice collapse feature (skylight).
2009/05/08 09:29:36	-15.389984	-174.250267	2128	22	1	1653	Want a sample of the rim of this collapse.
2009/05/08 09:30:12	-15.389983	-174.250261	2129	21	1	1653	SAMPLE Geology 6. **R415-rock-06**. Edge of pushed up burst "bubble". **[ridge crest ~40m S of Nov'08 temp anomaly]**
2009/05/08 09:31:21	-15.389986	-174.250259	2131	21	1	1652	J415-rock-06 cont. 5-6 cm tabular piece of fresh lava. ~2cm thick. Going to grab another piece.
2009/05/08 09:32:50	-15.389963	-174.250271	2134	23	3	1650	J415-rock-06 cont. Grabbed quite a large piece of the lobate skylight feature crust. Lat 15 23.399'S Long 174 15.017'W. Z=1654m
2009/05/08 09:33:27	-15.389910	-174.250274	2135	22	4	1648	Moving on along this ridge to the NE.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 09:34:01	-15.389868	-174.250270	2137	23	5	1646	Bulbous "pillow-like" feature.
2009/05/08 09:34:26	-15.389832	-174.250285	2138	23	4	1645	Nice collapse feature to the port side. Young lobates with some staining on the surface. Quite fresh.
2009/05/08 09:34:48	-15.389792	-174.250309	2140	23	2	1645	Only 30m or so from the temp anomaly target position.
2009/05/08 09:35:01	-15.389774	-174.250315	2141	23	2	1645	Seeing more staining on the rocks.
2009/05/08 09:35:28	-15.389758	-174.250300	2142	329	1	1645	Looks like the edge of a collapse feature.
2009/05/08 09:35:44	-15.389754	-174.250309	2144	332	1	1646	Haven't seen any pillars. "Can't have everything" says Ken.
2009/05/08 09:37:06	-15.389699	-174.250325	2146	29	4	1644	Still seeing young-stage lobate with some staining on it.
2009/05/08 09:37:29	-15.389660	-174.250339	2147	30	4	1645	**Coming up to the crest. Very near where the temp anomaly was in November.**
2009/05/08 09:38:26	-15.389535	-174.250314	2149	68	6	1644	See a white organism on it.
2009/05/08 09:38:43	-15.389504	-174.250298	2151	60	4	1644	Went down a little bit and now are seeing less (no) staining.
2009/05/08 09:39:17	-15.389457	-174.250274	2152	63	5	1643	Very glisteny black lavas. Pillows draping over the local highs.
2009/05/08 09:39:52	-15.389433	-174.250271	2154	83	4	1645	Beautiful pillow tube that shot over the side and terminates right along the lobate ridge.
2009/05/08 09:41:17	-15.389396	-174.250272	2156	70	8	1642	Chaotic; ribbon-folded young glassy pillow lavas.
2009/05/08 09:41:28	-15.389380	-174.250274	2157	85	8	1642	Changing HD tapes.
2009/05/08 09:41:42	-15.389377	-174.250275	2159	101	4	1642	Truncated edge of a pillow down here.
2009/05/08 09:42:45	-15.389383	-174.250263	2161	108	4	1641	Made an excursion to the east to see the extent of this glassy flow area.
2009/05/08 09:43:20	-15.389411	-174.250264	2162	105	5	1640	Turning around and heading back to the plan. Next target is Cast09 Temp Anomaly.
2009/05/08 09:43:42	-15.389424	-174.250263	2164	73	5	1640	We want to see if there is any heat being lost anywhere.
2009/05/08 09:44:19	-15.389442	-174.250243	2165	74	4	1640	Coming back to the drop off area.
2009/05/08 09:44:55	-15.389444	-174.250237	2167	74	4	1640	The white staining is probably due to the reaction of lava interacting with the sea water.
2009/05/08 09:46:01	-15.389447	-174.250223	2169	74	4	1640	Jason watch change. Tito is leaving and Will is arriving.
2009/05/08 09:47:59	-15.389259	-174.250109	2172	45	4	1642	Ken just described a feature as "flapjack lava".
2009/05/08 09:50:04	-15.389183	-174.250106	2175	53	3	1645	Zooming in on staining on the rocks. Thought it was shrimp but it's just staining.
2009/05/08 09:50:35	-15.389151	-174.250085	2177	56	4	1648	Starting to pick up more of the staining.
2009/05/08 09:51:18	-15.389117	-174.250042	2178	56	4	1647	Seeing young black volcaniclastic sand sitting on top of the young flow.
2009/05/08 09:51:27	-15.389106	-174.250029	2179	56	4	1647	Rubbly flow on top here.
2009/05/08 09:52:37	-15.389017	-174.250003	2182	49	5	1645	On the way to the 2008 temp anomaly target.
2009/05/08 09:54:03	-15.388941	-174.249964	2184	50	4	1643	Looks like we sort of grazed by the temp anomaly. Want to head due east to the anomaly target.
2009/05/08 09:54:58	-15.388916	-174.249956	2186	80	8	1641	Actually need to head due south to get to the anomaly area.
2009/05/08 09:56:55	-15.388890	-174.249844	2189	79	6	1633	Not a lick of pelagic sediment on this stuff.
2009/05/08 09:57:57	-15.388892	-174.249788	2191	99	4	1628	Must have been some local collapse. Lots of drain-out features.
2009/05/08 09:59:38	-15.388945	-174.249694	2194	99	4	1622	Looks a bit "spattery" in front of us.
2009/05/08 09:59:55	-15.388941	-174.249676	2195	99	5	1622	The water may look a bit murkier to us.
2009/05/08 10:00:53	-15.388959	-174.249642	2197	99	4	1620	Interesting little basket-looking feature.
2009/05/08 10:01:38	-15.388972	-174.249613	2199	103	4	1617	All these lavas appear to be the same age.
2009/05/08 10:04:28	-15.388986	-174.249555	2202	84	2	1618	**Didn't see anything (venting) at the "temp anomaly" site. Actually we were about 10 m from the spot.**
2009/05/08 10:05:36	-15.388980	-174.249473	2205	99	5	1618	**Still young lava. More vesicular and spattery.**
2009/05/08 10:08:05	-15.388768	-174.249358	2208	37	5	1627	We want to head 045 along the ridge to the very top of the ridge.
2009/05/08 10:08:35	-15.388757	-174.249342	2210	41	1	1630	Observing some collapse feature in front of us. Very fragile.
2009/05/08 10:08:40	-15.388754	-174.249341	2211	42	1	1630	A bit more staining here.
2009/05/08 10:09:48	-15.388695	-174.249263	2213	76	1	1629	We're off the chaotic flow type and back into lobate flows.
2009/05/08 10:10:00	-15.388693	-174.249261	2214	73	1	1629	Not as much staining as what we saw earlier.
2009/05/08 10:11:28	-15.388689	-174.249207	2216	73	4	1627	Lots of collapse features here.
2009/05/08 10:12:55	-15.388669	-174.249108	2219	73	4	1624	Lots of zooplankton or shrimp larvae (?) in the water.
2009/05/08 10:13:15	-15.388683	-174.249091	2220	93	2	1625	Haven't seen any hot water. Not much settlement on this pillow top.
2009/05/08 10:14:01	-15.388675	-174.249054	2222	89	3	1624	More chaotic and jumbled here. Pressure ridges and then down into flat-lying lobates.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 10:15:06	-15.388697	-174.248982	2224	88	2	1623	Going to take a sample. Don't want anything with white staining. Want fresh lavas.
2009/05/08 10:18:00	-15.388748	-174.248954	2228	106	5	1619	Tried to pick something up but it crumbled in the claw.
2009/05/08 10:19:07	-15.388617	-174.248915	2230	89	2	1624	Will is looking around.
2009/05/08 10:20:18	-15.388598	-174.248887	2232	81	2	1624	**Curtain-folded lavas. Edge of this lobate flow.**
2009/05/08 10:22:10	-15.388578	-174.248875	2235	82	3	1623	Attempting to rock sample but the rocks are crumbling.
2009/05/08 10:23:21	-15.388575	-174.248888	2237	91	3	1623	SAMPLE Geology 7. **J415-rock-07**. Zero-age lobates. Grabbing a piece of fresh lava. Crumbly rock - piece of lava lobe. **[ridge crest ~200m NE of Nov'08 temp anomaly]**
2009/05/08 10:23:51	-15.388575	-174.248898	2239	91	4	1622	7. J415-rock-07 cont. 20cm across 15 cm high. The shape of a mushroom or a bakers hat.
2009/05/08 10:25:36	-15.388577	-174.248911	2242	91	4	1622	J415-rock-07 cont. Shiny-zero age. The rock broke in half. Put it in crate 8 after it fell into crate 4. Part is in geobox 4 and part in geobox 8.
2009/05/08 10:26:38	-15.388577	-174.248913	2244	134	4	1622	J415-rock-07 cont. Lat 15 23.315'S 174 14.932'W. Z=1623
2009/05/08 10:26:53	-15.388587	-174.248901	2245	126	4	1621	Going to climb up a high area to the S/SE.
2009/05/08 10:27:40	-15.388651	-174.248869	2247	125	11	1613	Seeing a small amount of staining - or primary "stuff" from the actual extrusion.
2009/05/08 10:28:16	-15.388650	-174.248868	2248	125	12	1612	Let's go to the top here. We have been a bit north of the summit.
2009/05/08 10:28:58	-15.388656	-174.248864	2250	125	11	1613	Waiting for Medea
2009/05/08 10:30:54	-15.388674	-174.248859	2253	125	8	1615	Small amounts of staining
2009/05/08 10:32:13	-15.388694	-174.248842	2255	125	5	1616	Lots of staining here
2009/05/08 10:32:24	-15.388689	-174.248845	2256	125	6	1615	Some mat material here
2009/05/08 10:34:10	-15.388728	-174.248852	2259	142	5	1613	Some biofilm on the rocks
2009/05/08 10:35:19	-15.388724	-174.248856	2261	143	6	1612	No shimmering water
2009/05/08 10:37:04	-15.388810	-174.248860	2264	134	2	1612	Sometimes get a little bit of sulfide seeping out.
2009/05/08 10:37:36	-15.388832	-174.248804	2266	120	2	1614	More extensive white staining on these rocks here. Still on the young lava.
2009/05/08 10:38:03	-15.388840	-174.248813	2267	120	4	1612	Zooming in on the white stuff. Looks like we are **right at the summit.**
2009/05/08 10:38:34	-15.388818	-174.248843	2269	121	4	1611	**The white stuff was bacterial mat.**
2009/05/08 10:38:50	-15.388822	-174.248843	2270	120	4	1611	NAV Doppler reset Off by 4 or 5 meters.
2009/05/08 10:39:04	-15.388832	-174.248835	2271	121	4	1611	No shimmering water but are on the young lava flow.
2009/05/08 10:40:44	-15.388785	-174.248760	2274	93	7	1604	We're on the move again heading=041 Depth=1605m
2009/05/08 10:44:15	-15.388688	-174.248544	2278	143	5	1616	It's pretty murky here. Seeing some lobates and truncated pillows.
2009/05/08 10:45:13	-15.388637	-174.248496	2280	34	2	1619	Not seeing much staining.
2009/05/08 10:46:00	-15.388605	-174.248485	2282	42	3	1618	That looks like a lot of white staining. And now we're back to some black lavas. Curtain flow.
2009/05/08 10:46:30	-15.388593	-174.248497	2283	43	5	1615	A shrimp.
2009/05/08 10:46:53	-15.388572	-174.248505	2285	41	6	1614	Lots of void spaces in some of these lavas.
2009/05/08 10:47:37	-15.388536	-174.248505	2287	41	6	1610	"Uber curtain flow - or "messed-up bed sheet flow" Ken says.
2009/05/08 10:48:43	-15.388393	-174.248435	2289	42	4	1608	The pillow and lobate flows have a bit different look to them here.
2009/05/08 10:48:51	-15.388385	-174.248436	2290	42	5	1608	Long pillow tube under us.
2009/05/08 10:50:17	-15.388324	-174.248340	2292	43	6	1602	More staining here. A bit of a collapse with some white staining here.
2009/05/08 10:51:31	-15.388300	-174.248282	2294	44	5	1600	Here's a quite a large amount of staining and a bit of mat.
2009/05/08 10:52:32	-15.388286	-174.248267	2297	44	5	1599	Amazingly chaotic flow top here.
2009/05/08 10:54:24	-15.388189	-174.248175	2299	43	4	1592	More of the same.
2009/05/08 10:55:17	-15.388140	-174.248125	2301	43	4	1591	More coating on the rocks.
2009/05/08 10:58:21	-15.387912	-174.247974	2305	72	3	1583	Starting to see more white staining on the rocks.
2009/05/08 10:59:29	-15.387921	-174.247956	2307	82	5	1581	Seeing quite a bit of mat here.
2009/05/08 11:00:13	-15.387871	-174.247908	2309	58	6	1577	Jumbled flow continues.
2009/05/08 11:00:39	-15.387758	-174.247890	2311	29	5	1580	Going along the top of the ridge to the summit.
2009/05/08 11:01:00	-15.387728	-174.247869	2312	37	3	1582	Looking at collapse lobates again.
2009/05/08 11:02:00	-15.387626	-174.247830	2314	37	3	1582	Still approaching the top of the hill.
2009/05/08 11:02:13	-15.387618	-174.247821	2315	38	2	1583	Seeing more mat and an occasional fish.
2009/05/08 11:02:38	-15.387589	-174.247796	2317	38	3	1580	Shelly lobate crust.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 11:03:22	-15.387541	-174.247725	2318	108	2	1580	Hollow pillows. Very fluid.
2009/05/08 11:04:37	-15.387513	-174.247649	2321	97	3	1579	The water is getting murkier.
2009/05/08 11:06:20	-15.387478	-174.247603	2323	104	2	1581	We have found a bit of shimmering water here. Very low flow.
2009/05/08 11:08:05	-15.387477	-174.247591	2326	123	3	1580	We've zoomed it in. Don't see the source. Going to look around a lit.
2009/05/08 11:08:32	-15.387478	-174.247596	2328	121	3	1580	Don't see any shimmer. Saw a bit of lava drip.
2009/05/08 11:10:03	-15.387486	-174.247610	2330	121	3	1581	See the most very subtle shimmer in the area of white stuff.
2009/05/08 11:11:40	-15.387488	-174.247620	2333	121	3	1581	Going to take a temp probe here.
2009/05/08 11:18:02	-15.387494	-174.247604	2340	134	1	1581	We're going to dub this site "**Subtle Shimmer**". Lat 15 23.249'S Long 174 14.856'W. Temp=3.0 Depth=1582m. We're **at the top of this ridge**. Temp got up to 4.9
2009/05/08 11:19:16	-15.387495	-174.247607	2342	134	1	1581	Subtle Shimmer. 2 degrees above ambient. Made it up to 5.0
2009/05/08 11:21:49	-15.387491	-174.247615	2346	134	2	1581	There's a fish here - but not a vent fish.
2009/05/08 11:22:25	-15.387493	-174.247616	2347	134	2	1581	Stowing the probe. Move on up the ridge.
2009/05/08 11:24:51	-15.387476	-174.247563	2351	36	4	1577	Moving on up the ridge to the NE.
2009/05/08 11:27:52	-15.387281	-174.247487	2355	37	3	1580	Murky in here.
2009/05/08 11:29:41	-15.387263	-174.247446	2358	36	6	1576	High relief lavas.
2009/05/08 11:30:26	-15.387246	-174.247430	2359	38	5	1575	This lava looks intact. "Spattery" says Clague.
2009/05/08 11:32:35	-15.387230	-174.247342	2363	96	6	1571	Murky water. High relief flow top. Coming down a slope. No staining on the rocks. No biofilm
2009/05/08 11:33:40	-15.387198	-174.247281	2365	96	4	1574	Something swam by. Probably a worm of some type. Can't see the bottom now.
2009/05/08 11:33:54	-15.387185	-174.247277	2366	98	5	1575	Here comes the bottom again.
2009/05/08 11:36:22	-15.386922	-174.247049	2369	47	5	1586	Looking at the bottom here but can't really see much.
2009/05/08 11:36:39	-15.386884	-174.247044	2371	44	2	1588	We're flying too high to see much of anything.
2009/05/08 11:36:53	-15.386850	-174.247040	2372	44	3	1589	Coming down a bit to about 2 meters now.
2009/05/08 11:38:33	-15.386767	-174.247044	2375	36	2	1591	We're back in sight of the bottom again. We're out of the young stuff.
2009/05/08 11:38:49	-15.386764	-174.247042	2376	37	2	1591	A baby coral on the old rock.
2009/05/08 11:40:32	-15.386801	-174.247030	2378	43	3	1591	If there is young flow here we might expect to see it on either side of this ridge.
2009/05/08 11:40:41	-15.386802	-174.247033	2380	33	3	1591	**The ridge looks old in this area.**
2009/05/08 11:41:33	-15.386734	-174.246929	2382	33	4	1595	Older lavas. Pockets of black sediments on the older flow could be from the newer lava flow???
2009/05/08 11:44:12	-15.386609	-174.246821	2385	352	4	1604	**At the base of this is the young lava. Ridge of old material is to the left (N/NW) of this.**
2009/05/08 11:44:37	-15.386602	-174.246806	2387	24	1	1607	Changed HD tapes about 2 minutes ago.
2009/05/08 11:45:20	-15.386587	-174.246772	2388	24	3	1607	Looking at corals on the older flow.
2009/05/08 11:47:02	-15.386567	-174.246762	2391	350	1	1612	Pretty anemone on the older flow. It's orange. Also seeing small white corals.
2009/05/08 11:48:14	-15.386484	-174.246747	2393	12	2	1613	Driving over old pillows.
2009/05/08 11:49:16	-15.386375	-174.246716	2395	36	2	1619	These corals (the little white ones) only grow less than a millimeter a year.... hard to determine (Tim Shank says).
2009/05/08 11:49:46	-15.386325	-174.246687	2397	38	3	1623	He says it takes a long time for them to grow so seeing them at all tells you the lava has been there for a while.
2009/05/08 11:51:50	-15.386095	-174.246543	2400	53	3	1633	We're still looking at older pillows with a dusting of younger volcanic sediments (?).
2009/05/08 11:55:06	-15.386071	-174.246299	2404	53	1	1645	Some kind of staining on these lavas.
2009/05/08 11:56:10	-15.386072	-174.246283	2406	57	2	1646	Odd feature. Debate about whether or not this is old or young.
2009/05/08 11:57:32	-15.386000	-174.246298	2408	59	1	1647	Back in the young lavas again.
2009/05/08 11:58:16	-15.385937	-174.246254	2410	61	4	1647	**Lava pillar**
2009/05/08 12:00:30	-15.385792	-174.246283	2413	26	4	1642	Sand on top of older lavas
2009/05/08 12:08:32	-15.385803	-174.246478	2422	88	1	1647	Going over hole in lava roof
2009/05/08 12:11:23	-15.385834	-174.246448	2426	156	2	1647	Going to break off a piece of roof at edge of hole.
2009/05/08 12:11:38	-15.385834	-174.246445	2428	157	2	1647	Can now see a collapse within a collapse. Fish in bottom of hole.
2009/05/08 12:13:06	-15.385835	-174.246443	2430	157	2	1647	SAMPLE Geology 8. **J415-rock-08**. Broke piece of edge off roof at collapse pit. **[ridge crest]**
2009/05/08 12:15:06	-15.385843	-174.246459	2433	160	3	1647	J415-rock-08 cont. Going to place rock in inboard section of forward stbd milk crate.
2009/05/08 12:15:44	-15.385844	-174.246462	2435	160	3	1647	J415-rock-08 cont. Rock placed in inboard section of forward stbd milk crate.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 12:17:46	-15.385838	-174.246455	2438	158	3	1647	J415-rock-08 cont. This is a sample of the very youngest lava in the area. Part of that young lava flow. Depth=1647m
2009/05/08 12:21:11	-15.385836	-174.246337	2442	35	3	1647	Still sitting on collapse pit. Heading=034. Young lava constrained topographically and not very broad.
2009/05/08 12:21:56	-15.385835	-174.246294	2444	36	3	1646	Some sessile animals present. If on JdFR would be about 200yrs old (Clague comment).
2009/05/08 12:22:07	-15.385853	-174.246277	2445	36	3	1646	Dusting of black sediment on everything.
2009/05/08 12:22:21	-15.385876	-174.246254	2446	36	5	1645	Older flow is a folded sheet flow.
2009/05/08 12:23:10	-15.385864	-174.246202	2448	38	4	1644	Lava lake is in saddle between two highs on top of ridge.
2009/05/08 12:23:41	-15.385867	-174.246154	2450	39	3	1645	Now back onto lobate younger flow.
2009/05/08 12:23:50	-15.385872	-174.246148	2451	39	3	1645	Some staining in cracks between lobes.
2009/05/08 12:24:40	-15.385874	-174.246124	2453	39	3	1645	Little fish present.
2009/05/08 12:25:18	-15.385869	-174.246110	2454	39	3	1644	Looks like lobate flow is surrounding older flow with sediment on it.
2009/05/08 12:26:58	-15.385792	-174.246113	2459	38	2	1642	Pretty thick lobate flows. Almost pillows.
2009/05/08 12:27:23	-15.385759	-174.246102	2460	39	1	1642	Lots of staining in cracks on top of pillows. Some mat in cracks here and there.
2009/05/08 12:27:55	-15.385709	-174.246096	2462	39	3	1641	**Old flow is more jumbled than younger flow.**
2009/05/08 12:28:06	-15.385708	-174.246095	2463	37	3	1641	Young pillows have lots of staining in cracks.
2009/05/08 12:29:07	-15.385662	-174.246072	2466	39	2	1641	Another fish.
2009/05/08 12:29:44	-15.385631	-174.246057	2468	39	2	1640	Back on young lobate flows. Seems like quite a bit of staining and mats in cracks of lobes.
2009/05/08 12:30:09	-15.385625	-174.246056	2469	38	2	1640	Glass is not blindingly shiny here. Still a lot of precipitate on it.
2009/05/08 12:31:32	-15.385578	-174.246021	2471	39	2	1639	Going over a collapse pit.
2009/05/08 12:31:42	-15.385567	-174.246011	2473	40	2	1639	Back over sheet flow that has collapsed.
2009/05/08 12:32:10	-15.385532	-174.245991	2474	38	2	1639	This is a thicker crust that where we collected last sample.
2009/05/08 12:33:03	-15.385474	-174.245945	2476	37	3	1639	Pretty typical lava lake surface.
2009/05/08 12:33:21	-15.385451	-174.245926	2477	39	2	1639	Collapse lobate flow with bacterial mat on top.
2009/05/08 12:33:48	-15.385409	-174.245905	2479	38	1	1639	Lots of white on surfaces within pit but does not appear to have shimmering water.
2009/05/08 12:34:24	-15.385387	-174.245889	2480	38	2	1639	We are moving NW towards next high on ridge.
2009/05/08 12:35:58	-15.385258	-174.245970	2483	37	2	1639	**Contact with older lava again.**
2009/05/08 12:36:30	-15.385221	-174.245981	2484	35	1	1639	Pond is narrow. Lots of pyroclastic sand on top of older flows.
2009/05/08 12:36:54	-15.385208	-174.245954	2486	35	3	1638	Want to head back more easterly to criss-cross younger flow again.
2009/05/08 12:37:15	-15.385203	-174.245921	2487	38	2	1639	Some corals on older flow lobes.
2009/05/08 12:37:56	-15.385222	-174.245849	2489	36	2	1638	Back on young flow and immediately can see bacterial mats and staining in cracks again.
2009/05/08 12:38:58	-15.385245	-174.245771	2491	35	1	1638	**Young flow is trapped between two ridges in saddle. Collapse pits show lava lake to have been about 3 meters deep.**
2009/05/08 12:39:11	-15.385260	-174.245746	2492	37	1	1638	Lobate flows are right on edge of being bone-fide pillows.
2009/05/08 12:39:29	-15.385266	-174.245746	2493	39	1	1638	Frame Grab
2009/05/08 12:40:08	-15.385270	-174.245723	2495	39	2	1638	Looks more like mineral precipitate on inside of collapsed lobe.
2009/05/08 12:40:36	-15.385241	-174.245724	2497	37	2	1637	Starfish present.
2009/05/08 12:41:27	-15.385162	-174.245765	2498	43	3	1637	**On older flow again**. Starfish was really close to edge of older flow.
2009/05/08 12:41:47	-15.385132	-174.245746	2500	43	2	1637	Lots of sand on everything around. Not enough to scoop though.
2009/05/08 12:42:13	-15.385096	-174.245736	2501	44	2	1637	**Contact with younger flow.**
2009/05/08 12:43:03	-15.385097	-174.245717	2503	45	2	1637	Older flow has been broken by faulting and fissuring after emplacement. Fissuring is parallel to ridge.
2009/05/08 12:43:34	-15.385068	-174.245718	2505	41	2	1637	Tiny biology in lobes of younger flow here.
2009/05/08 12:43:47	-15.385030	-174.245710	2506	44	3	1636	Can't tell what they are.
2009/05/08 12:43:58	-15.385003	-174.245687	2507	45	3	1635	Right at edge of flow.
2009/05/08 12:44:09	-15.384977	-174.245673	2508	40	3	1634	Moving over older adjacent flow. Lots of sand on it.
2009/05/08 12:45:19	-15.384941	-174.245576	2510	27	5	1630	Trying to get east a bit to get back on young flow to cross it again.
2009/05/08 12:45:57	-15.384838	-174.245531	2512	25	4	1626	Still out over older flow.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 12:48:10	-15.384811	-174.245389	2515	49	4	1626	Have not seen the young flow for a bit. Need to get a little more SE to get back to young flow.
2009/05/08 12:49:47	-15.384751	-174.245351	2518	51	2	1627	Sand covering older flow.
2009/05/08 12:50:46	-15.384754	-174.245331	2520	50	2	1629	Want to move east to see edge of flow again.
2009/05/08 12:53:17	-15.384761	-174.245154	2523	49	1	1635	Younger lobe visible. Chunks on top imply an explosion scattered some pieces on top.
2009/05/08 12:53:24	-15.384768	-174.245136	2524	49	2	1635	**Found contact with young flow again.**
2009/05/08 12:56:34	-15.384721	-174.245107	2529	50	2	1634	Right at contact between young and older flow.
2009/05/08 12:56:56	-15.384719	-174.245115	2530	18	3	1634	Coral
2009/05/08 12:57:26	-15.384701	-174.245116	2532	9	2	1635	Bread-crust style pillow where glass rind got stretched after forming.
2009/05/08 12:57:34	-15.384703	-174.245118	2534	3	3	1635	Maybe a bamboo coral?
2009/05/08 12:58:22	-15.384678	-174.245108	2535	22	4	1634	Moving ship to north. Heading towards Nautilus vent.
2009/05/08 12:59:35	-15.384497	-174.244981	2538	19	3	1630	Seem to be some rather large pieces of black lava on top of older lavas. So not just sand out here. Some splatter fragments?
2009/05/08 13:00:05	-15.384435	-174.244934	2539	19	1	1631	Big pile of sand. Enough to scoop. Want to take a sample.
2009/05/08 13:00:36	-15.384429	-174.244923	2541	24	1	1631	Black sand deposit on top of jumbled sheet flow. Will try for a scoop bag sample.
2009/05/08 13:01:21	-15.384423	-174.244909	2542	24	1	1631	SAMPLE Geology 9. **J415-sed-09**. Bag may contain old and new stuff but should be easy to tell apart. Old stuff is brown. **[ridge crest ~100m S of Nautilus vent target]**
2009/05/08 13:03:09	-15.384434	-174.244906	2545	24	1	1631	J415-sed-09 cont. Lat 15 23.065'S Long 174 14.693'W. Depth=1632m. NELSC.
2009/05/08 13:04:30	-15.384472	-174.244916	2547	24	1	1631	J415-sed-09 cont. Repositioned handle in arm.
2009/05/08 13:05:38	-15.384498	-174.244914	2550	330	1	1631	J415-sed-09 cont. Lots of fine material. Scoop stirs up fine material. Material is sand as well as some dark larger chunks.
2009/05/08 13:06:22	-15.384509	-174.244909	2551	331	1	1631	J415-sed-09 cont. Deposit is plenty deep to get scoop. Using scoop bag with yellow label.
2009/05/08 13:07:55	-15.384207	-174.245006	2554	360	3	1616	J415-sed-09 cont. Driving to stay ahead of ship before stowing scoop.
2009/05/08 13:08:14	-15.384138	-174.245009	2555	42	2	1613	Heading north towards Nautilus vent site. Target is about 96 meters away.
2009/05/08 13:09:08	-15.384003	-174.244959	2557	36	3	1613	Nautilus vent would have to be in old flow so probably not associated with new eruption. If map is accurate vent will be on N side of ridge. New lava is on S side of ridge.
2009/05/08 13:10:41	-15.383968	-174.244926	2560	38	5	1613	J415-sed-09 cont. Stowing scoop bag in GeoBox#7.
2009/05/08 13:11:36	-15.383885	-174.244838	2562	42	1	1615	Big coral ahead.
2009/05/08 13:11:52	-15.383873	-174.244807	2563	36	2	1616	Correction. Big anemone.
2009/05/08 13:12:51	-15.383883	-174.244778	2566	39	2	1615	Laser on - anemone looks to be about 60-70 cm across.
2009/05/08 13:13:01	-15.383868	-174.244767	2567	38	2	1615	Old flow is quite a fluid-looking sheet flow.
2009/05/08 13:14:23	-15.383770	-174.244760	2569	40	3	1611	That was the largest animal we've seen so far.
2009/05/08 13:14:31	-15.383752	-174.244755	2571	4	5	1610	Water is somewhat murky.
2009/05/08 13:15:00	-15.383684	-174.244807	2572	335	7	1603	Jumbled sheet flow.
2009/05/08 13:16:10	-15.383550	-174.244924	2574	334	5	1600	**Still in jumbled sheet flow. Approx 10-15 animals per square meter in view now. Shrimp present.**
2009/05/08 13:17:07	-15.383472	-174.244920	2576	114	5	1602	More shrimp and other specks on rocks. Anemones and other things.
2009/05/08 13:18:06	-15.383447	-174.244834	2578	102	5	1600	Looking for Nautilus vent.
2009/05/08 13:19:13	-15.383383	-174.244709	2580	13	2	1603	Old jumbled flow.
2009/05/08 13:19:28	-15.383334	-174.244746	2581	292	5	1604	Far enough from new flow that black sand is not present.
2009/05/08 13:19:51	-15.383302	-174.244756	2583	339	1	1608	Smoke in water.
2009/05/08 13:20:49	-15.383227	-174.244777	2585	337	3	1608	**Mat in cracks in rocks. Flow is present. Shrimp. Shimmering water. Crab.**
2009/05/08 13:21:00	-15.383223	-174.244779	2586	331	3	1608	**Whole area is smoking.**
2009/05/08 13:21:13	-15.383223	-174.244767	2587	330	2	1608	Lots of crabs on rocks.
2009/05/08 13:22:58	-15.383157	-174.244690	2590	214	5	1610	Crabs of different varieties including galatheids. **Venting area is about 20-25 meters away from Nautilus vent target position.**
2009/05/08 13:23:27	-15.383116	-174.244677	2591	203	3	1614	Looking around for more intense focused vent. Area is generally smoking.
2009/05/08 13:23:54	-15.383114	-174.244675	2593	199	2	1616	Big mound of mussels. Crabs on top.
2009/05/08 13:24:18	-15.383112	-174.244678	2594	199	2	1616	Two or 3 different types of crab. Gastropod. Squat lobsters.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 13:25:07	-15.383107	-174.244676	2597	199	2	1617	Shimmering water.
2009/05/08 13:25:32	-15.383105	-174.244677	2599	198	2	1617	Temp up to 3.1
2009/05/08 13:26:30	-15.383103	-174.244678	2601	199	2	1617	Getting ready to use bio suction sampler.
2009/05/08 13:28:40	-15.383114	-174.244688	2604	197	2	1617	SAMPLE Biology 10. **J415-bio-10**. Using big suction sampler to get a bit of whatever can be sampled. Shrimp. Crab. Mussels. We'll see what we can get. **[Nautilus vent area]**
2009/05/08 13:31:35	-15.383128	-174.244699	2608	192	2	1617	10. J415-bio-10 cont. Black chamber is lined up to receive sample.
2009/05/08 13:34:08	-15.383128	-174.244704	2611	193	2	1617	10. J415-bio-10 cont. Catching shrimp. squat lobsters. Got the fish. Fish is not happy about this! Crab. Bigger crab.
2009/05/08 13:34:40	-15.383128	-174.244705	2613	193	2	1617	10. J415-bio-10 cont. Calling this sample "multi-bio" so new name is J415-multibio-10.
2009/05/08 13:36:12	-15.383127	-174.244704	2615	193	2	1617	J415-multibio-10 cont. Still sucking up all kinds of critters.
2009/05/08 13:37:23	-15.383123	-174.244700	2617	193	2	1617	J415-multibit-10 cont. Suction sampler not sucking anymore. Changed to flush chamber. Rock fragments coming out.
2009/05/08 13:38:57	-15.383117	-174.244693	2620	193	2	1617	J415-multibio-10 cont. Lat 15 22.986'S Long 174 14.681'W. Depth=1618m
2009/05/08 13:40:09	-15.383121	-174.244691	2622	196	2	1617	Snails seen in HDvideo screen
2009/05/08 13:42:24	-15.383127	-174.244689	2625	178	2	1617	SAMPLE Biology 11. **J415-multibio-11**. Suction sample. Going into blue chamber. Repositioning a little for fresh animals. About 2 feet from last sample. **[Nautilus vent area]**
2009/05/08 13:45:22	-15.383130	-174.244686	2629	178	2	1617	J415-multibio-11 cont. Sampling whatever can be sucked up. Shrimp. Crabs. Got a couple of mussels.
2009/05/08 13:45:49	-15.383129	-174.244685	2631	179	2	1617	J415-multibio-11 cont. Pilot watch change. Continuing sampling. Want especially to try to get some snails.
2009/05/08 13:51:03	-15.383129	-174.244706	2637	178	2	1617	J415-multibio-11 cont. Looking for snails to sample.
2009/05/08 13:51:38	-15.383128	-174.244703	2639	178	2	1617	J415-multibio-11 cont. Got a snail in blue chamber.
2009/05/08 13:53:28	-15.383124	-174.244687	2641	178	2	1617	J415-multibio-11 cont. A few mussels just sucked up.
2009/05/08 13:56:47	-15.383107	-174.244704	2646	178	2	1618	J415-multibio-11 cont. Switched to flush chamber. Temp=4.1 after sitting here for awhile.
2009/05/08 13:58:07	-15.383106	-174.244715	2648	178	2	1618	J415-multibio-11 cont. Placed Temp probe between rocks. Temp=19.1
2009/05/08 13:59:16	-15.383114	-174.244714	2650	178	2	1618	J415-multibio-11 cont. Tmax= 19.2 moving probe to a different spot between a couple of mussels. Tmax at this spot=9.7
2009/05/08 14:01:02	-15.383135	-174.244696	2653	178	2	1618	J415-multibio-11 cont. Temp=9.1 between a different bunch of mussels.
2009/05/08 14:02:47	-15.383145	-174.244677	2656	178	2	1618	J415-multibio-11 cont. Taking temp next to rock they want to sample with barnacles on it. Tmax=7.5
2009/05/08 14:03:30	-15.383144	-174.244672	2657	179	2	1618	J415-multibio-11 cont. Putting temp probe away to return to sucking up critters.
2009/05/08 14:05:43	-15.383137	-174.244671	2661	178	2	1618	SAMPLE Biology 12. **J415-BioGeo-12**. Want to sample the rock with barnacles on it. **[Nautilus vent area]**
2009/05/08 14:06:52	-15.383138	-174.244678	2663	178	2	1618	J415-BioGeo-12 cont. Rock with barnacles being placed in port Bio box.
2009/05/08 14:07:32	-15.383140	-174.244682	2665	178	2	1618	J415-multibio-11 cont. Continuing to sample with suction sampler into BLUE chamber (so sample is considered #11 continued).
2009/05/08 14:08:19	-15.383142	-174.244687	2666	178	2	1618	J415-multibio-11 cont. Looking to suck up some squat lobsters and more snails. Just sucked up some snails.
2009/05/08 14:09:15	-15.383142	-174.244692	2668	178	2	1618	J415-multibio-11 cont. Now getting squat lobsters and a couple of mussels.
2009/05/08 14:13:43	-15.383140	-174.244691	2674	179	2	1616	J415-multibio-11 cont. Moving Jason slightly.
2009/05/08 14:17:12	-15.383144	-174.244690	2678	178	3	1616	J415-multibio-11 cont. Getting more shrimp. Crabs and shrimp and a small fish.
2009/05/08 14:17:54	-15.383145	-174.244689	2680	178	3	1616	J415-multibio-11 cont. Done with this sample. Closing blue chamber.
2009/05/08 14:18:52	-15.383147	-174.244688	2682	178	3	1616	J415-multibio-11 cont. Position at end of suction sampling is Lat 15 22.988'S Long 174 14.681'W. Depth=1618m
2009/05/08 14:19:11	-15.383148	-174.244688	2683	178	3	1616	Now want to do a scoop bag sample.
2009/05/08 14:22:30	-15.383158	-174.244688	2687	178	3	1616	SAMPLE Biology **J415-mussles-13**. Scoop bag with Red tape. **[Nautilus vent area]**
2009/05/08 14:24:30	-15.383157	-174.244691	2690	178	3	1616	SAMPLE Biology 13. J415-mussles-13. Big clump of mussels on a rock went into port bio box.
2009/05/08 14:27:23	-15.383153	-174.244695	2694	178	3	1616	13. J415-mussles-13 cont. Trying to get more mussels.
2009/05/08 14:29:56	-15.383142	-174.244691	2698	178	3	1616	J415-mussles-13 cont. Moving slightly for a better clump of mussels.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 14:32:56	-15.383146	-174.244682	2702	177	3	1616	J415-mussles-13 cont. Clump of mussels in scoop bag (red). Scraping up some more.
2009/05/08 14:34:03	-15.383150	-174.244679	2704	178	3	1616	J415-mussles-13 cont. Scoop placed in box with barnacle rock and clump of mussels previously put in. This sample is in the Bio box on "front porch".
2009/05/08 14:34:45	-15.383150	-174.244679	2706	179	3	1616	J415-mussles-13 cont. If previous notation said Port Bio box that is incorrect. All things in bio box on front porch are from this spot.
2009/05/08 14:35:48	-15.383149	-174.244681	2708	179	3	1616	J415-mussles-13 cont. Temp probe in place where mussels were harvested. Tmax=8.0
2009/05/08 14:37:29	-15.383144	-174.244686	2710	179	3	1616	J415-mussles-13 cont. Location at end of sampling Lat 15 22.988'S Long 174 14.681'W. Taking another temperature reading. Tmax=8.3
2009/05/08 14:39:03	-15.383143	-174.244687	2713	179	3	1616	Temp probe into crack under rock. Tmax=20.1
2009/05/08 14:39:38	-15.383145	-174.244686	2715	179	3	1616	Temp probe in a different spot. Looking for a place to take a major sampler water sample.
2009/05/08 14:40:27	-15.383146	-174.244684	2716	179	3	1616	Temp where mussels were actually sitting. Tmax=9.2
2009/05/08 14:41:44	-15.383147	-174.244680	2719	181	3	1616	Now temp probe is in a different crevice nearby. Tmax=20.1
2009/05/08 14:42:57	-15.383147	-174.244678	2721	180	3	1616	HD video has picture of curly worm case.
2009/05/08 14:43:12	-15.383146	-174.244678	2722	180	3	1616	Temp probe is being stowed.
2009/05/08 14:43:28	-15.383145	-174.244678	2723	180	3	1616	Major sampler with Green tape is picked up.
2009/05/08 14:44:50	-15.383147	-174.244681	2726	180	3	1616	SAMPLE Fluid 14. **J415-major-14**. Green tape major sampler taking fluid sample from between rocks where temp was 20.1 **[Nautilus vent area]**
2009/05/08 14:46:10	-15.383147	-174.244687	2728	180	3	1616	J415-major-14 cont. Weak flow of somewhat smoky water coming out of crack where sample is being taken. Sample complete.
2009/05/08 14:47:09	-15.383150	-174.244690	2730	180	3	1616	Green major sampler is stowed on stbd side.
2009/05/08 14:47:56	-15.383154	-174.244691	2732	180	3	1616	Grabbing worm with curly tube casing for Rick.
2009/05/08 14:49:05	-15.383158	-174.244688	2734	180	3	1616	SAMPLE Biology 15. **J415-tubeworm-15**. Placed tube worm in bio box. **[Nautilus vent area]**
2009/05/08 14:50:05	-15.383157	-174.244684	2736	181	3	1616	J415-worm-15 cont. Bio box on front porch is location of this sample.
2009/05/08 14:50:21	-15.383157	-174.244683	2737	181	3	1616	J415-worm-15 cont. Looking for another tube worm.
2009/05/08 14:51:07	-15.383159	-174.244681	2739	180	3	1616	NAV Doppler reset
2009/05/08 14:53:06	-15.383152	-174.244681	2742	180	3	1616	J415-worm-15 cont. Grabbed rock with tube worm attached. Placed into bio box on front porch.
2009/05/08 14:53:40	-15.383150	-174.244683	2744	180	3	1616	J415-worm-15 cont. One more rock with a tube worm on it placed in bio box on front porch.
2009/05/08 14:55:00	-15.383147	-174.244690	2746	180	3	1616	J415-worm-15 cont. Taking temperature at spot where worms were picked up. Tmax=8.9
2009/05/08 14:55:41	-15.383147	-174.244693	2748	180	3	1616	Taking temp on rock with worm on it. Tmax=11.0
2009/05/08 14:56:58	-15.383145	-174.244698	2750	180	3	1616	Polychaete worm.
2009/05/08 14:57:34	-15.383146	-174.244698	2752	180	3	1616	Now want to leave a marker.
2009/05/08 14:58:02	-15.383146	-174.244698	2753	180	3	1616	J415-worm-15 cont. Position at end of sampling: Lat 15 22.995'S Long 174 14.683'W. Depth=1617m
2009/05/08 14:58:19	-15.383145	-174.244696	2754	181	3	1616	Moving up to top of slope to leave a marker.
2009/05/08 15:01:30	-15.383152	-174.244681	2758	176	3	1615	**Deployed Mkr-148 just upslope from tubeworm sample site.** Tube worms with plume out.
2009/05/08 15:02:25	-15.383156	-174.244676	2760	175	3	1615	Marker number 148.
2009/05/08 15:03:23	-15.383161	-174.244672	2762	175	3	1615	Position of Marker 148: Lat 15 22.989'S Long 174 14.684'W. Depth=1618
2009/05/08 15:04:37	-15.383165	-174.244671	2765	175	3	1616	Marker is right next to tube worms with plumes extended.
2009/05/08 15:06:35	-15.383167	-174.244677	2768	186	3	1615	SAMPLE Biology Want to get some of the worms from here. Lots of barnacles on rocks around the worms.
2009/05/08 15:10:48	-15.383165	-174.244668	2773	187	3	1615	SAMPLE Biology 16. **J415-tubeworms-16**. Temp amongst worms Tmax>17 between rocks. Out where worms are=8.8 Worms are on bare rocks next to mussels. **[Nautilus Mkr-148]**
2009/05/08 15:11:32	-15.383167	-174.244668	2775	187	3	1615	J415-worm-16 cont. Putting temp probe away. Picking up worms.
2009/05/08 15:12:49	-15.383173	-174.244668	2777	179	3	1614	J415-worm-16 cont. Moved marker to other side of worm outcrop to be able to pick up worms more easily (still the same position)
2009/05/08 15:13:36	-15.383173	-174.244672	2779	185	3	1615	J415-worm-16 cont. Worms just out of reach. Positioning sub slightly differently to be able to get to them.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 15:19:15	-15.383164	-174.244667	2785	186	3	1615	J415-worm-16 cont. Finally got two rocks with worms attached. Placed into bio box with other specimens from this site. And one more rock that has worms and barnacles and mussels.
2009/05/08 15:19:30	-15.383164	-174.244666	2786	186	3	1615	J415-worm-16 cont. Placed in bio box on front porch.
2009/05/08 15:20:07	-15.383164	-174.244664	2788	186	3	1615	Now want to get a gastight
2009/05/08 15:24:25	-15.383165	-174.244675	2793	185	3	1615	SAMPLE Fluid 17. **J415-GTB-17**. Using unmarked gastight (stbd side). **[Nautilus Mkr-148]**
2009/05/08 15:25:57	-15.383166	-174.244675	2796	185	3	1615	J415-GTB-17 cont. Gas tight fired.
2009/05/08 15:27:30	-15.383167	-174.244673	2798	185	3	1615	J415-GTB-17 cont. Gastight placed back in stbd side of forward milk crate. Secured.
2009/05/08 15:29:21	-15.383167	-174.244672	2801	185	3	1615	Taking temperature of spot where gastight was fired. Tmax=20.5
2009/05/08 15:31:15	-15.383168	-174.244671	2804	185	3	1615	Tmax at gastight location increased to 20.7
2009/05/08 15:33:51	-15.383170	-174.244664	2810	185	3	1615	Final Tmax at gastight location = 20.9
2009/05/08 15:34:34	-15.383171	-174.244665	2812	183	3	1615	Preparing to head east toward the edge of the flow - 120m to the East.
2009/05/08 15:38:11	-15.383097	-174.244656	2816	91	5	1614	**Heading east .**
2009/05/08 15:47:14	-15.383007	-174.244131	2826	89	2	1609	Still on old flow different morphology.
2009/05/08 15:47:30	-15.383003	-174.244110	2827	91	1	1608	We are going due east until we find the edge of the flow.
2009/05/08 15:48:29	-15.382995	-174.244015	2829	91	2	1610	Still heading east.
2009/05/08 15:48:38	-15.382994	-174.243996	2831	91	1	1610	Fair amount of black sand on top of these old pillows.
2009/05/08 15:51:53	-15.382996	-174.243895	2835	91	3	1611	Still heading east.
2009/05/08 15:52:08	-15.382997	-174.243886	2836	91	2	1612	Bigger sand deposits here.
2009/05/08 15:54:17	-15.383006	-174.243744	2839	91	4	1614	Ctenophore just floated by.
2009/05/08 15:54:39	-15.383000	-174.243741	2841	41	3	1614	VIDEO Start recording HDCam High Def tapes were changed .
2009/05/08 15:55:14	-15.382996	-174.243740	2842	79	4	1614	Back into jumbled sheet flows.
2009/05/08 15:56:47	-15.383000	-174.243582	2845	91	2	1617	Been going down hill for awhile.
2009/05/08 15:58:14	-15.383025	-174.243435	2847	89	2	1625	Lots of sand.
2009/05/08 15:58:25	-15.383033	-174.243416	2848	90	2	1626	Sponges on top of old flow.
2009/05/08 15:59:27	-15.383059	-174.243328	2850	90	5	1632	Some microbial mat in view we think.
2009/05/08 15:59:38	-15.383065	-174.243311	2852	89	3	1633	We are on the new flow.
2009/05/08 15:59:58	-15.383065	-174.243314	2853	322	2	1636	**Lobate flow and there is the contact.**
2009/05/08 16:00:07	-15.383064	-174.243308	2854	325	1	1636	Lobate flow ramped in against the ridge on this side.
2009/05/08 16:01:46	-15.383074	-174.243312	2857	349	1	1636	Pig hollow pillows lined with white microbial and or mineral precipitate.
2009/05/08 16:01:53	-15.383074	-174.243316	2858	349	1	1636	Setting down to sample a rock that has the white stuff on it.
2009/05/08 16:02:16	-15.383077	-174.243326	2859	349	1	1636	Taking a rock sample.
2009/05/08 16:02:41	-15.383081	-174.243338	2861	350	1	1636	SAMPLE Geology **J415-rock-18 [E of Mkr-148]**
2009/05/08 16:03:05	-15.383085	-174.243349	2862	349	1	1636	J415-rock-18 cont. Trying to pull the crust off the top of this pillow after breaking off a couple of pieces
2009/05/08 16:03:37	-15.383103	-174.243348	2864	48	1	1635	J415-rock-18 cont. Holding onto J415-rock-18 while we catch up with the ship
2009/05/08 16:03:55	-15.383123	-174.243297	2865	84	2	1635	J415-rock-18 cont. The rock is from the top of a collapsed lava lake.
2009/05/08 16:04:51	-15.383172	-174.243123	2867	88	4	1629	J415-rock-18 cont. Lat 15 22.9854'S Long 174 14.5994'W is where we took the sample.
2009/05/08 16:05:10	-15.383205	-174.243032	2868	88	4	1629	We are out of the new flow again.
2009/05/08 16:06:34	-15.383105	-174.242795	2871	45	6	1630	We are trying to catch up with Medea and the ship.
2009/05/08 16:08:39	-15.382915	-174.242782	2874	44	2	1628	We are now stopping to store the rock in the outer starboard compartment PI Clague.
2009/05/08 16:09:12	-15.382902	-174.242790	2875	44	2	1628	Rock is now in crate.
2009/05/08 16:10:08	-15.382891	-174.242822	2877	44	2	1628	Jason is dropping a weight.
2009/05/08 16:11:07	-15.382893	-174.242857	2879	49	3	1626	We are back on the old flow and need to get onto the new.
2009/05/08 16:11:35	-15.382902	-174.242870	2881	48	1	1628	We are right on contact.
2009/05/08 16:13:12	-15.382924	-174.242848	2883	49	1	1630	We are getting under Medea before proceeding onto the new flow.
2009/05/08 16:16:30	-15.382885	-174.242752	2886	67	2	1633	We are proceeding to the northeast to the new flow.
2009/05/08 16:22:08	-15.382747	-174.242627	2893	67	3	1644	We are still trying to get the ship and everything aligned.
2009/05/08 16:24:16	-15.382666	-174.242463	2896	68	1	1656	Bottom in site - still on old rocks.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 16:24:49	-15.382617	-174.242433	2898	70	1	1656	We are now on the new flow.
2009/05/08 16:25:09	-15.382612	-174.242433	2899	50	1	1656	Lots of cracks in the basalt lined with white bacterial mat.
2009/05/08 16:25:21	-15.382605	-174.242426	2900	51	1	1656	Vent fish.
2009/05/08 16:25:38	-15.382590	-174.242410	2902	51	1	1656	That pillow looks like a dinosaur egg.
2009/05/08 16:26:13	-15.382578	-174.242398	2903	49	1	1658	We just made the pillow a collapsed pillow.
2009/05/08 16:26:18	-15.382581	-174.242399	2904	50	1	1658	More particulate in the water column again.
2009/05/08 16:26:40	-15.382578	-174.242390	2906	50	2	1657	Shrimp just went by.
2009/05/08 16:27:34	-15.382574	-174.242335	2908	51	5	1655	There must be venting near by.
2009/05/08 16:28:19	-15.382574	-174.242297	2909	50	1	1658	Back on old flow but we are right near the contact still.
2009/05/08 16:29:47	-15.382585	-174.242225	2912	52	1	1665	Now we are back on the new flow.
2009/05/08 16:29:55	-15.382581	-174.242218	2913	50	2	1664	There is some light sedimentation.
2009/05/08 16:30:06	-15.382580	-174.242207	2914	51	3	1664	Medea and Jason aren't getting along.
2009/05/08 16:30:13	-15.382571	-174.242194	2915	51	2	1664	Trying to follow the contact as best we can.
2009/05/08 16:31:53	-15.382501	-174.242089	2918	50	1	1665	There is a lot of white lining on these pillows.
2009/05/08 16:32:14	-15.382492	-174.242065	2919	50	2	1666	Another shrimp.
2009/05/08 16:32:40	-15.382461	-174.242048	2921	49	2	1665	Lots of pillows here.
2009/05/08 16:32:56	-15.382428	-174.242040	2922	50	1	1665	This indicates a lower eruption rate here.
2009/05/08 16:35:40	-15.382304	-174.241959	2926	50	2	1663	More lava.
2009/05/08 16:36:37	-15.382268	-174.241922	2928	51	2	1663	Nice shiny lavas.
2009/05/08 16:36:53	-15.382252	-174.241903	2929	50	3	1661	Lots of pillow lavas - big pile.
2009/05/08 16:37:26	-15.382223	-174.241868	2930	50	2	1660	**As we have moved north went from jumbled sheet flows to lobate flows to ponded lava flows and now pillow flows.**
2009/05/08 16:37:39	-15.382212	-174.241858	2932	51	2	1660	That's a big picture of the entire dive and this indicates eruption rate.
2009/05/08 16:39:34	-15.382177	-174.241768	2935	358	2	1660	Looks like there is some hydrothermal staining on the bottom of this rock.
2009/05/08 16:40:44	-15.382183	-174.241749	2937	358	2	1660	Nice big patch of orange iron hydrothermal staining.
2009/05/08 16:41:14	-15.382188	-174.241741	2938	51	2	1660	**Continuing to follow the contact.**
2009/05/08 16:41:48	-15.382169	-174.241708	2940	49	2	1659	At the contact again.
2009/05/08 16:42:02	-15.382163	-174.241702	2941	48	2	1658	Seeing the old lava.
2009/05/08 16:42:57	-15.382162	-174.241700	2943	310	4	1658	Looking right at the contact.
2009/05/08 16:43:09	-15.382158	-174.241708	2944	310	4	1658	Trying to determine if this is the northern extent of the flow.
2009/05/08 16:44:51	-15.382141	-174.241763	2947	9	4	1656	This is intermixed old and new.
2009/05/08 16:45:05	-15.382148	-174.241770	2948	247	3	1656	The new flow is pretty thin here
2009/05/08 16:47:01	-15.382110	-174.241786	2951	269	4	1655	Tracking new flow around to west.
2009/05/08 16:50:36	-15.382096	-174.241731	2956	268	4	1655	Sitting in one spot deciding which way to go next.
2009/05/08 16:56:19	-15.382068	-174.241785	2962	314	4	1654	Jason heading is 315. Moving northwest across the saddle. Trying to define boundary of contact between new and old lava flow.
2009/05/08 16:56:52	-15.382049	-174.241786	2964	315	5	1652	Unsedimented fresh lava.
2009/05/08 16:57:07	-15.382044	-174.241786	2965	315	4	1652	All pillows.
2009/05/08 16:57:24	-15.382008	-174.241781	2966	313	4	1651	No clastic debris visible.
2009/05/08 16:59:23	-15.381866	-174.241721	2969	314	2	1648	Still going over fresh pillows.
2009/05/08 17:00:11	-15.381841	-174.241753	2971	313	3	1645	Debris on top of pillows now.
2009/05/08 17:01:29	-15.381839	-174.241761	2973	312	4	1644	Moving up a slight slope.
2009/05/08 17:02:16	-15.381814	-174.241832	2975	315	2	1642	**Found contact between new and old lava**. Now over old lava.
2009/05/08 17:05:40	-15.381857	-174.241748	2980	316	5	1643	Traveling along contact between new and old lavas.
2009/05/08 17:06:14	-15.381850	-174.241727	2981	316	6	1643	Lots of sand on top of old pillows.
2009/05/08 17:09:10	-15.381837	-174.241674	2985	103	13	1634	Deciding again how best to define extent of new flow.
2009/05/08 17:12:57	-15.381764	-174.241986	2990	328	5	1635	Continue on to NE to see how far new flow goes. Get a rock sample at northernmost end if possible.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J415 log comments (NELSC)
2009/05/08 17:16:04	-15.381804	-174.241985	2994	330	3	1635	Need to get ship moving to east.
2009/05/08 17:17:10	-15.381826	-174.241934	2996	328	4	1634	Want to get a rock sample at northern edge of new flow.
2009/05/08 17:18:35	-15.381675	-174.241880	2999	330	9	1634	SAMPLE Fluid 19. **J415-major-19**. Lat 15 22.907'S Long 174 14.515'W. Tripped for background sample. **[NE of Mkr-148]**
2009/05/08 17:19:20	-15.381719	-174.241800	3000	333	8	1634	J415-major-19 cont. Yellow major sampler.
2009/05/08 17:20:24	-15.381768	-174.241841	3002	261	6	1635	J415-major-19 cont. Sample taken at depth of 1635m.
2009/05/08 17:21:28	-15.381860	-174.242134	3004	260	9	1635	Jason moving southwest.
2009/05/08 17:28:44	-15.381908	-174.242211	3013	91	9	1635	We have been pretty well sitting in one spot.
2009/05/08 17:31:02	-15.382086	-174.242136	3016	91	7	1635	Waiting for ship to catch up so we can continue moving NE with Jason.
2009/05/08 17:36:26	-15.382302	-174.242036	3022	94	17	1635	Still waiting for ship to reposition.
2009/05/08 17:39:46	-15.382336	-174.241918	3027	15	2	1657	Over new (?) lavas now.
2009/05/08 17:42:16	-15.382339	-174.241917	3030	323	1	1657	SAMPLE Geology 20. **J415-rock-20**. Picking up a flat 1.5 inch slab of lobate flow crust. From hollow lobate flow. **[NE of Mkr-148]**
2009/05/08 17:42:58	-15.382337	-174.241920	3032	324	1	1657	J415-rock 20 cont. placing it in GeoBox #3.
2009/05/08 17:43:42	-15.382340	-174.241917	3034	326	2	1656	J415-rock-20 cont. Lat 15 22.940'S Long 174 14.515'W
2009/05/08 17:44:08	-15.382332	-174.241889	3035	21	2	1655	J415-rock-20 cont. Depth=1657m
2009/05/08 17:45:18	-15.382483	-174.241727	3037	127	1	1669	Ship is moving southeast. Following lava to get to old stuff again
2009/05/08 17:47:10	-15.382585	-174.241576	3040	161	2	1675	Sand on top of old flow. Animal present.
2009/05/08 17:47:39	-15.382618	-174.241623	3042	164	2	1678	Lots of floc in the water here.
2009/05/08 17:49:09	-15.382632	-174.241615	3044	154	1	1680	At contact with old and young lavas.
2009/05/08 17:50:30	-15.382635	-174.241624	3046	157	1	1680	Aft cam shows nice view of new pillow on top of old ones.
2009/05/08 17:52:10	-15.382729	-174.241589	3049	154	2	1685	Moving again.
2009/05/08 17:54:57	-15.382762	-174.241533	3053	154	2	1689	Jason is moving southeast. Still seeing contact between old and new lavas.
2009/05/08 17:57:38	-15.382857	-174.241398	3057	156	5	1696	Removing last weight.
2009/05/08 17:59:07	-15.382847	-174.241259	3059	150	5	1705	HiDef tape #6 is switched off. Not starting another - dive is almost over.
2009/05/08 17:59:43	-15.382847	-174.241252	3061	149	1	1710	Lovely elongate tubular pillows draped over steep slope. Black sand in creases. These are old pillows.
2009/05/08 18:00:12	-15.382867	-174.241405	3062	190	3	1709	Contact with new lava.
2009/05/08 18:00:23	-15.382861	-174.241406	3063	291	6	1708	That's all Folks.
2009/05/08 18:00:43						1704	JASON off bottom
2009/05/08 18:58:25						3	MEDEA on deck
2009/05/08 19:07:30						1	JASON on deck

J2-416 Dive Log

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 03:02:41			3073	211	198	1	JASON in water.
2009/05/09 03:04:13			3074	222	198	1	JASON is not in the water after all. Hung out over the water and then saw an oil drip.
2009/05/09 03:04:27			3075	222	198	1	JASON is back on deck.
2009/05/09 03:04:51			3076	222	198	1	Could be a hydraulic problem?
2009/05/09 03:11:21			3077	278	198	2	JASON in water.
2009/05/09 03:11:36			3078	273	184	3	It's in the water now. Looks like we're in business.
2009/05/09 03:13:22			3079	224	2	3	Medea in the water.
2009/05/09 04:10:50			3080	206	84	1728	Tasks J416: Take push cores if sediment pockets.
2009/05/09 04:11:19			3081	217	76	1737	Tasks J416 cont. Find fresh lava flows and hydrothermal vents along track line.
2009/05/09 04:11:46			3082	216	37	1737	Tasks J416 cont. Collect rocks; sands; core; biology.
2009/05/09 04:12:04			3083	216	75	1737	Tasks J416 cont. Find vents and conduct sampling.
2009/05/09 04:12:18			3084	216	75	1737	Tasks J416 cont. Fluid and biology sampling at Maka vent if time.
2009/05/09 04:12:31			3085	217	74	1737	Tools: Multi-chamber suction sampler.
2009/05/09 04:13:04			3086	217	74	1737	Tools cont. 5 scoop bags; 4 gas tights; 4 majors.
2009/05/09 04:13:43			3087	217	75	1737	Basket: milk crates for rock samples. 2 bio boxes; 4 gastights; 4 majors; 5 markers; 5 scoop bags.
2009/05/09 04:20:47	-15.389200	-174.253562	3089	143	4	1813	JASON on bottom.
2009/05/09 04:22:10	-15.389223	-174.253563	3092	143	3	1814	On the bottom in a sedimented area.
2009/05/09 04:27:35	-15.389231	-174.253573	3098	143	3	1814	Waiting on bottom.
2009/05/09 04:29:34	-15.389215	-174.253580	3101	143	3	1814	Waiting on bottom dealing with a power issue of some sort.
2009/05/09 04:30:18	-15.389211	-174.253573	3103	143	3	1814	Heading=143.2 Depth=1814 Alt=-5.4 Ambient temp 2.3.
2009/05/09 04:32:30	-15.389285	-174.253581	3107	150	2	1814	Heading 149 moving up ridge towards next way point.
2009/05/09 04:33:13	-15.389263	-174.253554	3109	149	2	1814	Sedimented bottom peppered with bowling-ball sized rocks.
2009/05/09 04:36:39	-15.389232	-174.253560	3113	129	2	1815	SAMPLE Geology **J416-sed-01**. Lat -15 23.351 Long -174 15.215. Depth=1815m. Sediment pushcore. Looks like pelagic sediment with volcaniclastics on top. For Clague. **[near landing site west and downslope of the ridge]**
2009/05/09 04:38:07	-15.389212	-174.253561	3116	129	2	1815	J416-sed-01 cont. Core about 2/3 full.
2009/05/09 04:38:37	-15.389203	-174.253555	3117	130	2	1815	Going for a scoop sample.
2009/05/09 04:41:54	-15.389234	-174.253574	3121	129	2	1815	**J416-sed-02**. Scoop sample for Clague. Depth=1815m Alt=-5.7 Lat -14 23.351 Long -174.15.214. Scoop # 28. More pelagic sediment with volcaniclastics on top.
2009/05/09 04:42:52	-15.389241	-174.253586	3123	130	2	1815	J416-sed-02 cont. Put into the right back porch enclosure.
2009/05/09 04:43:37	-15.389242	-174.253592	3125	130	2	1815	Heading 130 moving up ridge.
2009/05/09 04:45:37	-15.389150	-174.253501	3128	142	4	1813	Taking a look at a larger rock and older with some sponges on it.
2009/05/09 04:46:10	-15.389208	-174.253517	3130	143	4	1812	Old pillow fragment.
2009/05/09 04:48:26	-15.389431	-174.253547	3133	153	3	1808	Moving up the slope covered with sediments.
2009/05/09 04:50:15	-15.389458	-174.253529	3136	154	2	1808	Pieces of debris here.
2009/05/09 04:50:29	-15.389451	-174.253525	3137	154	2	1808	Starting to pick up larger pieces of debris here on the sed surface.
2009/05/09 04:51:16	-15.389420	-174.253504	3139	156	3	1807	Looks like 20-25 percent of the surface is covered with larger pieces of rubble.
2009/05/09 04:51:23	-15.389454	-174.253529	3140	156	3	1806	Traveling upslope.
2009/05/09 04:51:51	-15.389487	-174.253552	3141	155	3	1806	Larger rock in video.
2009/05/09 04:52:30	-15.389461	-174.253522	3143	155	3	1805	Seeing at least 2 kinds of rubble. Older reddish (almost baked) and ropier - not sure if it is younger.
2009/05/09 04:53:00	-15.389447	-174.253493	3144	156	2	1804	Black volcanic seds in patches now. Less rubble.
2009/05/09 04:54:15	-15.389361	-174.253350	3147	150	2	1802	Piece of pink coral ahead.
2009/05/09 04:54:40	-15.389419	-174.253355	3148	153	3	1799	Looks like the coral rolled down the slope.
2009/05/09 04:55:23	-15.389565	-174.253393	3150	155	3	1795	Lots of sediment and not a lot else.
2009/05/09 04:55:55	-15.389570	-174.253353	3151	155	4	1793	The slope is 15 to 20 degrees.
2009/05/09 04:56:17	-15.389622	-174.253361	3153	154	4	1792	Seds looking like they are getting blacker here. Volcaniclastic.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 04:56:29	-15.389647	-174.253363	3154	155	3	1792	Outcrop ahead - not much of one.
2009/05/09 04:56:41	-15.389652	-174.253353	3155	156	3	1791	Could have been a piece of debris.
2009/05/09 04:57:18	-15.389649	-174.253308	3157	156	4	1789	Occasional very rubbly piles.
2009/05/09 04:58:23	-15.389694	-174.253265	3159	157	4	1786	Small rubble and interspersed sediments.
2009/05/09 04:58:48	-15.389784	-174.253299	3160	157	3	1785	About 50 percent small rubble and seds. Getting into cobble here.
2009/05/09 05:01:24	-15.390071	-174.253287	3164	181	4	1773	Starting to pick up larger pieces of debris here. More rubble.
2009/05/09 05:02:03	-15.390016	-174.253196	3166	181	4	1771	Primarily larger pieces of debris.
2009/05/09 05:02:42	-15.389950	-174.253105	3167	181	4	1770	Our goal is to find the contact between the new and old lavas. Right now it looks like most of the lava is covered with seds and debris.
2009/05/09 05:03:07	-15.389976	-174.253101	3169	181	3	1769	Chaotic - but now intact. Rubble-strewn field.
2009/05/09 05:03:44	-15.390020	-174.253104	3170	181	3	1767	Some of the debris looks shiny now.
2009/05/09 05:03:55	-15.390066	-174.253127	3171	183	3	1766	Lots of flat plates.
2009/05/09 05:04:50	-15.390255	-174.253219	3173	142	3	1762	Looking at what could be a lobate surface with debris on top of it.
2009/05/09 05:05:09	-15.390259	-174.253208	3175	142	3	1761	When we get closer it is sediments.
2009/05/09 05:05:46	-15.390273	-174.253189	3176	143	4	1758	Technically identified as a "pile of rock".
2009/05/09 05:05:53	-15.390281	-174.253190	3177	143	5	1758	Lots of plates in the debris.
2009/05/09 05:07:31	-15.390288	-174.253084	3180	115	5	1754	We are discussing if we should take a sed core for Dave.
2009/05/09 05:08:39	-15.390397	-174.253087	3182	117	5	1750	Bob thinks we are starting to see some in-place surfaces covered with seds.
2009/05/09 05:09:43	-15.390442	-174.253062	3184	117	3	1748	Not sure if we are looking at the substrate poking out of the seds or if it's debris.
2009/05/09 05:10:35	-15.390466	-174.253050	3186	119	3	1746	That one has something growing on it so it must be older. Lots of black sediment by it.
2009/05/09 05:11:10	-15.390453	-174.253029	3188	120	2	1747	Will see if this is older material to sample then will take a sediment scoop.
2009/05/09 05:11:26	-15.390447	-174.253022	3189	121	2	1747	Pillow fragment with something growing on it seems to be in place.
2009/05/09 05:11:39	-15.390443	-174.253019	3190	120	2	1747	Stained brownish-orange. Definitely older material.
2009/05/09 05:14:52	-15.390423	-174.253031	3194	124	3	1746	Couldn't get that piece of lava. Something swimming with lots of appendages. Looks like a swimming centipede.
2009/05/09 05:15:50	-15.390391	-174.253002	3196	125	3	1746	Trying to sample this older lava.
2009/05/09 05:16:49	-15.390461	-174.253031	3198	123	4	1743	We're just going to keep cruising around. Continuing up slope. Didn't take a sample there.
2009/05/09 05:17:25	-15.390475	-174.253024	3200	125	3	1744	More solid stuff up slope here.
2009/05/09 05:17:43	-15.390466	-174.253009	3201	126	3	1743	Ken wants to get something old.
2009/05/09 05:18:47	-15.390445	-174.252966	3203	125	3	1743	SAMPLE Geology 3. **J416-rock-03**. Grabbing a piece of this plate. It was intact. **[climbing up the north side of the ridge toward ridge crest]**
2009/05/09 05:19:52	-15.390440	-174.252952	3205	125	3	1743	J416-rock-03 cont. Small fragment with iron oxide staining on other surfaces. 1 cm thick glass rind. Looks fairly vesicular.
2009/05/09 05:21:06	-15.390451	-174.252973	3208	125	3	1743	J416-rock-03 cont. Taking pics of the sample. Lat 15 23.427'S Long 174 15.178'W. Depth=1744m. Went into box 3a.
2009/05/09 05:21:28	-15.390455	-174.252983	3209	125	3	1743	Scoop of sediment next.
2009/05/09 05:21:49	-15.390458	-174.252991	3210	125	3	1743	J416-rock-03 cont. Sample for Ken Rubin.
2009/05/09 05:23:55	-15.390427	-174.252969	3213	125	3	1743	SAMPLE Geology 4. **J416-sed-04**. Sediment right next to previous sample. Mixture of sediments. Green scoop bag.
2009/05/09 05:24:32	-15.390411	-174.252936	3215	124	4	1742	J416-sed-04. Same position as previous sample. Taken right next to sample 3.
2009/05/09 05:26:20	-15.390597	-174.252955	3218	128	3	1735	Moving upslope.
2009/05/09 05:26:51	-15.390604	-174.252930	3219	128	3	1733	Lots of debris here on the surface of the sediments.
2009/05/09 05:27:37	-15.390601	-174.252884	3221	129	4	1731	Surface covered with large pieces of debris.
2009/05/09 05:28:20	-15.390622	-174.252867	3223	130	5	1729	Looks like a big piece of young(?) stuff. Actually it's not that young....
2009/05/09 05:29:03	-15.390653	-174.252865	3225	133	4	1727	Orange staining here on the lavas. Debating if it is young or old.
2009/05/09 05:29:36	-15.390638	-174.252840	3226	135	5	1726	We're looking at the lavas and debating if they are old or young.
2009/05/09 05:29:48	-15.390644	-174.252839	3227	135	6	1725	Saw some white staining and has nothing growing on it.
2009/05/09 05:30:10	-15.390671	-174.252845	3229	136	7	1723	This is a bit orange so don't know....

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 05:30:21	-15.390677	-174.252842	3230	136	7	1723	Still sediment around here.
2009/05/09 05:30:54	-15.390734	-174.252863	3231	136	8	1722	The debate continues. It is in place and that's about all we can say.
2009/05/09 05:31:36	-15.390751	-174.252853	3233	110	4	1723	Zooming in to try to figure it out.
2009/05/09 05:32:04	-15.390767	-174.252850	3235	109	4	1723	Calling it "quite shelly" here.
2009/05/09 05:32:42	-15.390830	-174.252875	3236	110	3	1722	Almost all rubbly surface here and pillow-like looking stuff.
2009/05/09 05:33:04	-15.390845	-174.252875	3238	110	3	1722	Extremely chaotic seafloor.
2009/05/09 05:33:22	-15.390840	-174.252863	3239	110	4	1722	See something living on the rubble.
2009/05/09 05:33:41	-15.390850	-174.252863	3240	111	4	1721	Could have fallen down slope (of course).
2009/05/09 05:35:29	-15.390922	-174.252892	3243	125	3	1718	Seeing some shiny pieces of lava here.
2009/05/09 05:37:20	-15.390799	-174.252774	3246	133	3	1716	Orang-ish coating on the shiny rock in front of it.
2009/05/09 05:38:17	-15.390880	-174.252787	3248	134	4	1712	Proceeding up slope. Primarily rubble on the surface.
2009/05/09 05:39:29	-15.390960	-174.252770	3250	134	3	1709	We're close to the place where we saw the contact yesterday.
2009/05/09 05:40:05	-15.391000	-174.252761	3252	137	4	1706	Large pieces of debris on the slope here.
2009/05/09 05:42:38	-15.391119	-174.252743	3255	138	4	1699	Continuing on upslope.
2009/05/09 05:43:04	-15.391167	-174.252768	3257	139	4	1698	Lots of this could just be mass wasting.
2009/05/09 05:43:41	-15.391145	-174.252746	3258	138	4	1698	Lots of white spots on the ground. Broken off pieces of lava.
2009/05/09 05:44:45	-15.391294	-174.252818	3260	138	4	1695	Broken up pieces of the curtain fold on slopes.
2009/05/09 05:46:38	-15.391302	-174.252679	3263	137	12	1679	Still moving up slope.
2009/05/09 05:47:10	-15.391392	-174.252685	3265	142	4	1675	**Looks like we are at the contact now. 1680m.**
2009/05/09 05:47:51	-15.391453	-174.252658	3266	147	5	1673	This is beautiful. We're in the new lava now. No rubble on it etc.
2009/05/09 05:48:11	-15.391473	-174.252641	3268	146	5	1672	Pillow lavas that are broken open in places.
2009/05/09 05:48:54	-15.391479	-174.252584	3269	148	5	1669	Great pillow right there. We were watching them form at West Mata a couple days ago.
2009/05/09 05:49:13	-15.391524	-174.252595	3271	149	5	1668	Morphology is really changing a lot here. Lobate crust ahead.
2009/05/09 05:49:34	-15.391534	-174.252584	3272	96	6	1667	VIDEO Start recording HDCam in .the new lava flow
2009/05/09 05:50:55	-15.391537	-174.252557	3274	81	6	1664	**Curtain-folded sheet flows.**
2009/05/09 05:51:05	-15.391551	-174.252566	3276	83	4	1663	VIDEO Stop recording HDCam
2009/05/09 05:51:43	-15.391473	-174.252507	3277	134	7	1662	This is a huge-collapsed tower...
2009/05/09 05:52:39	-15.391384	-174.252422	3279	163	8	1663	Somewhere on top we are hoping to see something that looks vent-like. If nothing is obvious we will turn to the south.
2009/05/09 05:53:11	-15.391395	-174.252397	3281	204	3	1663	Looks like we are at the edge of a collapse with ribbon folded sheets.
2009/05/09 05:54:09	-15.391702	-174.252542	3283	146	4	1658	Rubbly lava. Spatter tephra quality. Probably closer to the eruptive fissure.
2009/05/09 05:55:39	-15.391739	-174.252427	3285	149	1	1660	Staining on the rind of this rock. It's a broken pillow.
2009/05/09 05:56:47	-15.391793	-174.252381	3287	146	1	1662	Lots of particulates in the water column.
2009/05/09 05:57:23	-15.391939	-174.252449	3289	149	2	1665	Non-vent fish just swam by.
2009/05/09 05:58:54	-15.391975	-174.252440	3291	147	1	1668	Seeing more orange stain in the cracks of this lobate flow.
2009/05/09 05:59:44	-15.391946	-174.252414	3293	147	1	1668	Here's another fish. The same one we saw earlier.
2009/05/09 06:00:54	-15.392019	-174.252461	3295	148	1	1669	Great looking plates here.
2009/05/09 06:01:47	-15.392147	-174.252540	3297	219	3	1668	Probably looking at the underside of lobate crusts. Looks like fruit bowls.
2009/05/09 06:03:36	-15.392063	-174.252419	3300	209	1	1669	Tito is trying to poke a hole in this.
2009/05/09 06:04:39	-15.391965	-174.252299	3302	207	1	1670	Rick got so excited he turned on the DVCam. Reeled him in. The DVCam is off again.
2009/05/09 06:05:25	-15.392214	-174.252434	3304	214	3	1668	We are **turning around and heading 200**. Moving to the SW along this ridge.
2009/05/09 06:06:40	-15.392224	-174.252386	3306	186	2	1668	**We've already come out of the contact.** We see a coral on this lobate.
2009/05/09 06:07:51	-15.392209	-174.252361	3308	188	2	1668	The young lava comes right to where the slope comes up. No will to go up hill.
2009/05/09 06:10:30	-15.392141	-174.252336	3312	187	2	1668	SAMPLE Geology 5 . **J416-sed-05**. Volcaniclastic sand from the top of this older flow. It's pretty coarse on the top and fine-grained on the bottom. Scoop bag 29. **[not quite at ridge crest traveling S]**
2009/05/09 06:11:30	-15.392062	-174.252252	3314	182	4	1666	J416-sed-05 cont. Lat 15 23.531'S Long 174 15.144'W. Depth=1668m. Finished the sample.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 06:12:46	-15.392411	-174.252414	3316	185	4	1660	Seeing stalked crinoids and some corals here. **Obviously older because of the biology.**
2009/05/09 06:13:02	-15.392429	-174.252406	3318	185	3	1660	More and more stalked crinoids ahead of us.
2009/05/09 06:13:50	-15.392409	-174.252339	3319	233	3	1659	Seeing stalked crinoids.
2009/05/09 06:14:13	-15.392429	-174.252336	3321	259	1	1660	VIDEO Start recording HDCam stalked crinoids. For Tim Shank.
2009/05/09 06:15:20	-15.392452	-174.252329	3323	260	1	1659	Coral on the rocks now.
2009/05/09 06:16:07	-15.392467	-174.252346	3325	259	3	1658	VIDEO Stop recording HDCam
2009/05/09 06:17:02	-15.392388	-174.252311	3327	257	1	1660	We're back at the **young lava** again. Want to go to the top and see where it is coming from and if there is venting.
2009/05/09 06:19:59	-15.392596	-174.252561	3330	258	1	1659	Trying to find the contact again. Lots of old pillow lavas.
2009/05/09 06:20:09	-15.392587	-174.252561	3332	259	2	1658	More stalked crinoids.
2009/05/09 06:22:45	-15.392553	-174.252667	3335	219	4	1658	We want black lava... **Looking for the contact.** We may be out of the new flow.
2009/05/09 06:23:27	-15.392567	-174.252708	3337	220	5	1657	We are seeing the young lava again here.
2009/05/09 06:23:39	-15.392530	-174.252689	3338	219	5	1657	Jumbled sheet flow transitioning into lobate flows.
2009/05/09 06:24:35	-15.392585	-174.252752	3340	246	2	1658	Correction: This is not new. Seeing critters on the lava. The morphology is a bit different.
2009/05/09 06:25:58	-15.392591	-174.252764	3342	243	1	1660	Going to sample this jumbled sheet flow at 1660 meters. **Older flow with biology.**
2009/05/09 06:29:10	-15.392578	-174.252726	3347	243	1	1660	SAMPLE Geology 6. **J416-rock-06**. Large rock from old flow. Piece of curtain-folded jumbled sheet. Slightly stained. Older lavas. **[Near ridge crest traveling S]**
2009/05/09 06:32:51	-15.392703	-174.252864	3351	244	2	1659	J416-rock-06 cont. Lat 15 23.555'S Long 174 15.165'W. Depth=1660m. Placed on top of scoop samples in the aft.
2009/05/09 06:33:50	-15.392539	-174.252820	3353	246	1	1661	We're looking for black lava.
2009/05/09 06:35:25	-15.392555	-174.252978	3356	234	3	1664	We're traveling to the SW looking for fresh lava.
2009/05/09 06:36:09	-15.392493	-174.252985	3358	199	3	1665	We see old pillows with corals on them.
2009/05/09 06:37:19	-15.392562	-174.253091	3360	200	2	1667	Glass sponge on this old stuff.
2009/05/09 06:38:37	-15.392620	-174.253136	3362	195	3	1666	Nice arrangement of lavas. Pillows flowed down slope here.
2009/05/09 06:41:17	-15.392668	-174.253136	3366	186	5	1666	Waiting for the ship again.
2009/05/09 06:42:16	-15.392615	-174.253117	3368	185	5	1668	Moving again.
2009/05/09 06:42:34	-15.392635	-174.253146	3369	185	4	1669	Don't see anything growing here.
2009/05/09 06:42:59	-15.392695	-174.253213	3370	185	4	1669	We could be back on the new stuff?
2009/05/09 06:44:56	-15.392564	-174.253255	3373	185	4	1673	Hard to tell what is going on here. No real visible contact zones.
2009/05/09 06:45:48	-15.392629	-174.253356	3375	185	4	1673	The high stuff sticking up is old. We see glass sponges and corals on the higher pillow.
2009/05/09 06:46:56	-15.392707	-174.253459	3377	185	3	1674	Sorry to say that it is **not sheet flows between these older pillows. It's sediment on top of an older flow.**
2009/05/09 06:48:10	-15.392634	-174.253430	3380	182	2	1676	Now we're getting into some sands. This is our "terrestrial home".
2009/05/09 06:49:47	-15.392786	-174.253591	3382	187	2	1676	Stalked crinoid. What is that? There's an anemone and a snail on the coral. **Coral polyps.**
2009/05/09 06:50:22	-15.392907	-174.253703	3384	214	2	1674	Flat plane of sediments.
2009/05/09 06:51:01	-15.392810	-174.253673	3385	215	3	1676	Doesn't look like there is anything ahead of us. We are out of the debris and outcrops.
2009/05/09 06:51:07	-15.392801	-174.253672	3387	218	3	1677	Ripples in view.
2009/05/09 06:53:28	-15.392738	-174.253756	3390	184	3	1680	Biology -- coral.
2009/05/09 06:54:25	-15.392857	-174.253838	3392	184	2	1679	Searching for contact.
2009/05/09 06:55:31	-15.392809	-174.253773	3394	183	3	1677	Rippled sandy surface peppered with rock debris.
2009/05/09 06:56:16	-15.392860	-174.253790	3396	183	2	1677	Considering collecting more sediments.
2009/05/09 06:57:22	-15.392882	-174.253793	3398	184	3	1674	Biology -- whip. Biology coral
2009/05/09 06:57:47	-15.392891	-174.253803	3399	183	3	1674	Taking picture of coral.
2009/05/09 06:58:28	-15.392915	-174.253832	3401	183	3	1674	Biology -- dead black coral.
2009/05/09 06:59:16	-15.392997	-174.253905	3403	183	3	1672	Biology -- whip.
2009/05/09 06:59:55	-15.393055	-174.253958	3404	180	2	1674	Reached top of crest. Old lobates. Biology - whip.
2009/05/09 07:00:31	-15.392969	-174.253905	3406	164	4	1674	Old lobates.
2009/05/09 07:00:46	-15.392962	-174.253903	3407	172	4	1674	Biology -- whip.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 07:01:14	-15.392989	-174.253926	3409	174	3	1675	Old lobates dusted with volcanic sand.
2009/05/09 07:01:23	-15.392989	-174.253928	3410	174	3	1675	Heading 173.
2009/05/09 07:01:49	-15.393004	-174.253938	3411	174	3	1675	NAV Doppler reset
2009/05/09 07:02:59	-15.393148	-174.254020	3413	173	3	1673	Old pillows dusted with black sand.
2009/05/09 07:03:26	-15.393076	-174.253956	3415	155	3	1673	Biology -- anemone and coral.
2009/05/09 07:03:44	-15.393042	-174.253924	3416	154	4	1673	Capturing anemone picture.
2009/05/09 07:04:23	-15.393152	-174.253978	3418	161	4	1670	Old pillows.
2009/05/09 07:05:24	-15.393160	-174.253933	3420	172	4	1667	Biology -- starfish. Old pillows on steep slope.
2009/05/09 07:05:45	-15.393140	-174.253899	3421	174	5	1666	Picture of sponge.
2009/05/09 07:06:12	-15.393214	-174.253923	3423	173	4	1664	Old pillows transitioning into lobate. Originated from south ridge.
2009/05/09 07:07:26	-15.393401	-174.253956	3425	173	3	1658	Pillows dusted with sand.
2009/05/09 07:07:38	-15.393413	-174.253949	3426	172	2	1659	Biology -- coral.
2009/05/09 07:07:49	-15.393395	-174.253922	3427	148	3	1659	Curtain folded sheet.
2009/05/09 07:08:21	-15.393399	-174.253878	3429	175	4	1656	Biology -- coral.
2009/05/09 07:08:35	-15.393479	-174.253916	3430	177	2	1656	Biology -- large coral.
2009/05/09 07:09:42	-15.393624	-174.253940	3432	180	3	1655	Lobate lavas.
2009/05/09 07:10:11	-15.393706	-174.253972	3434	180	2	1654	Biology -- whip.
2009/05/09 07:11:01	-15.393825	-174.254027	3435	181	1	1654	Biology -- whip.
2009/05/09 07:11:37	-15.393758	-174.253966	3437	183	2	1654	Biology -- dead coral cover with gastropods.
2009/05/09 07:12:15	-15.393701	-174.253909	3439	182	1	1655	Moving upslope to top of ridge.
2009/05/09 07:13:27	-15.393552	-174.253747	3441	139	5	1651	Heading 135.
2009/05/09 07:13:59	-15.393656	-174.253778	3442	139	2	1652	Changing heading to 135 to reach the ridge top quicker.
2009/05/09 07:14:09	-15.393650	-174.253758	3444	139	2	1652	Jumbled sheets.
2009/05/09 07:16:13	-15.394048	-174.253798	3447	139	4	1649	More of a sheet morphology developing as approaching crest.
2009/05/09 07:16:45	-15.394056	-174.253754	3448	126	5	1648	Dusting of black sand on the flow.
2009/05/09 07:17:30	-15.394043	-174.253697	3450	144	5	1649	Old sheet flow covered with volcanic sand.
2009/05/09 07:18:19	-15.394059	-174.253695	3452	143	4	1650	Roughly 100 meters to go till ridge crest.
2009/05/09 07:19:12	-15.394073	-174.253712	3454	143	4	1650	Waiting for the ship to catch up.
2009/05/09 07:19:49	-15.394049	-174.253701	3455	143	4	1650	Old sheet flow covered with dusting of volcanic sand.
2009/05/09 07:21:04	-15.394195	-174.253776	3458	142	4	1646	Moving up ridge.
2009/05/09 07:21:21	-15.394220	-174.253778	3459	142	4	1645	Large mound of rock debris.
2009/05/09 07:22:13	-15.394206	-174.253699	3461	142	1	1646	Large pillows.
2009/05/09 07:22:45	-15.394145	-174.253601	3462	142	3	1645	More pillows on steep slope.
2009/05/09 07:22:55	-15.394151	-174.253586	3463	140	3	1644	Some lobate in the background.
2009/05/09 07:23:55	-15.394186	-174.253502	3465	141	2	1643	Searching for sample for Rubin as heading to the top.
2009/05/09 07:24:36	-15.394258	-174.253494	3467	145	1	1641	Large pillows dusted with volcanic sediment. Heavily colonized.
2009/05/09 07:26:08	-15.394257	-174.253437	3470	127	2	1641	Biology - crinoid.
2009/05/09 07:27:41	-15.394323	-174.253524	3472	126	2	1641	**J416-rock-07**. Rock being broken off Lobate crust in old lava. Large covered with sediment. Depth=1641m Alt=1.8 **[ridge crest]**
2009/05/09 07:28:53	-15.394330	-174.253557	3474	125	2	1641	J416-Rock-07 cont. For Rubin Lat 15 23.657'S Long 174 15.211'W. Geobox #2.
2009/05/09 07:29:37	-15.394265	-174.253496	3476	126	3	1640	J416-rock -07 cont. Sample is flat and about 20 cm long.
2009/05/09 07:30:13	-15.394174	-174.253393	3478	126	3	1640	**End operations in NELSC and heading to Maka.**
2009/05/09 07:30:31	-15.394130	-174.253332	3479	126	3	1639	Ambient Temp=2.4
2009/05/09 07:31:34	-15.394174	-174.253217	3481	46	15	1622	**Maka is about 4.5 km away. Transit will take around three hours.**
2009/05/09 10:03:45	-15.416919	-174.278009	3483	32	198	1218	still in transit
2009/05/09 10:26:56	-15.420307	-174.281340	3484	28	196	1218	still in transit
2009/05/09 10:47:31	-15.422893	-174.284550	3485	45	199	1306	The ship is at the site. We're up in the water column.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 11:04:00	-15.423536	-174.285592	3490	221	3	1576	Approaching Maka where we know there are smokers. Maka is at the southern end of NELSC. It's an active site. Possibly the only place we will see sulfides?
2009/05/09 11:04:07	-15.423531	-174.285588	3492	219	6	1578	JASON on bottom
2009/05/09 11:04:29	-15.423491	-174.285563	3493	222	6	1584	We see pillow lavas. Pretty murky here.
2009/05/09 11:05:05	-15.423473	-174.285568	3495	229	3	1593	Great big anemone.
2009/05/09 11:06:43	-15.423556	-174.285695	3497	230	4	1596	**Down on the bottom.** Depth=1597m. Pillow lavas that look quite young. Don't see much on these. Did see a small coral when we landed.
2009/05/09 11:09:58	-15.423735	-174.285725	3501	57	5	1594	Driving up slope. See a few glass sponges.
2009/05/09 11:10:54	-15.423574	-174.285566	3503	51	3	1595	Broken up lavas here. Going to take a sample. Don't want to get too close to the vent because of alteration.
2009/05/09 11:13:56	-15.423513	-174.285538	3507	36	3	1595	SAMPLE Geology 8. **J416-rock-08**. Location: Lat 15 25.413'S Long 174 17.131'W. Depth=1597m. Doesn't look that old. Rubbly. Want it for the chemistry. **[near the landing spot on S side of Maka]**
2009/05/09 11:16:34	-15.423522	-174.285594	3511	33	6	1593	J416-rock-08 cont. Cube-shaped with a thin glassy rind. Geobox #4. Depth=1594m.
2009/05/09 11:18:20	-15.423494	-174.285574	3514	33	6	1593	J416-rock-08 cont. Lots of orange staining on 2 sides. PI Rubin.
2009/05/09 11:19:07	-15.423494	-174.285574	3516	33	6	1593	Rubble. Broken up pillows.
2009/05/09 11:23:36	-15.423334	-174.285466	3521	36	12	1582	**Starting upslope again SW of summit**. Talus. Looks like sample was flow breccia. Pillow scarp here. Relatively youthful pillows with light sediment.
2009/05/09 11:24:22	-15.423317	-174.285458	3523	44	5	1578	No sign of hydrothermal stuff yet. Depth=1578m
2009/05/09 11:25:04	-15.423302	-174.285450	3524	49	5	1573	Pillows seem to be getting larger now.
2009/05/09 11:26:28	-15.423249	-174.285410	3527	49	3	1573	Removing a weight.
2009/05/09 11:29:06	-15.423010	-174.285208	3531	45	8	1569	Payload may be maxed out - no more rock samples for this dive?
2009/05/09 11:29:19	-15.422963	-174.285172	3532	51	5	1571	Moving NE towards summit.
2009/05/09 11:30:08	-15.422945	-174.285128	3534	48	6	1569	Tubular pillows. All about the same age. Light sediment cover. No large corals seen.
2009/05/09 11:30:57	-15.422997	-174.285120	3535	47	5	1565	No evidence of pyroclastic material on top of pillows.
2009/05/09 11:32:36	-15.422748	-174.284864	3538	48	5	1563	Not a lot of variation in size and morphology of pillows.
2009/05/09 11:32:49	-15.422747	-174.284855	3539	48	5	1563	Some pillows have breadcrust structure.
2009/05/09 11:33:19	-15.422658	-174.284767	3541	47	6	1563	About 80m from target according to position entered into nav.
2009/05/09 11:33:59	-15.422647	-174.284730	3542	48	4	1562	More fluff and some floc in water.
2009/05/09 11:34:31	-15.422633	-174.284689	3544	47	5	1560	Small things (animals) on rocks.
2009/05/09 11:36:23	-15.422670	-174.284561	3547	90	5	1554	Trying to get a look at what is on the rocks. Small white spots but can't tell what they are.
2009/05/09 11:37:45	-15.422790	-174.284534	3549	88	4	1546	More material in the water. About 70-80m from target.
2009/05/09 11:39:12	-15.422682	-174.284433	3552	31	2	1543	Shrimp and galatheid crabs swimming up from rocks as Jason passes over.
2009/05/09 11:43:17	-15.422256	-174.284326	3557	29	10	1548	Pilot is adjusting the forward-looking sonar
2009/05/09 11:44:44	-15.422462	-174.284384	3560	67	2	1550	Lots of animals on rocks. Water getting very cloudy. Vent is nearby.
2009/05/09 11:45:12	-15.422467	-174.284345	3562	109	4	1550	Tubeworms.
2009/05/09 11:46:00	-15.422354	-174.284192	3563	105	4	1549	**Weak flow** where tubeworm cluster is.
2009/05/09 11:46:40	-15.422346	-174.284139	3565	104	4	1548	Mussels on tube worms
2009/05/09 11:47:23	-15.422288	-174.284061	3567	62	3	1548	Tubeworms. Mussels. Galatheid crabs. Shrimp.
2009/05/09 11:49:04	-15.422308	-174.284046	3569	122	3	1547	Galatheid crabs all over the rocks. Another patch of tube worms. Shrimp. Mussels.
2009/05/09 11:49:17	-15.422301	-174.284041	3571	120	4	1547	Fish.
2009/05/09 11:49:44	-15.422481	-174.284166	3572	123	2	1546	Nice field of mussels.
2009/05/09 11:49:56	-15.422502	-174.284181	3573	123	4	1545	Flour bags!
2009/05/09 11:50:17	-15.422521	-174.284197	3575	122	3	1545	Flour bags are probably weights from the Nautilus ROV that was here in 2008.
2009/05/09 11:51:19	-15.422516	-174.284200	3577	45	3	1544	Lots of tubeworms.
2009/05/09 11:51:39	-15.422533	-174.284214	3578	51	3	1544	Coverage of tubeworms is increasing.
2009/05/09 11:52:16	-15.422469	-174.284165	3580	50	4	1544	Mussels amongst tubeworms. Limpets on rocks.
2009/05/09 11:52:52	-15.422392	-174.284105	3581	30	3	1544	Tim says tubeworms look like melabrachia columna.
2009/05/09 11:53:33	-15.422190	-174.283959	3583	64	3	1541	Moving towards target position again.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 11:54:12	-15.422243	-174.283970	3585	93	5	1537	Sulfide spotted.
2009/05/09 11:54:29	-15.422205	-174.283928	3586	108	5	1535	Dead chimney.
2009/05/09 11:55:15	-15.422216	-174.283881	3588	145	8	1529	Lots of staining on rocks. Looks like an active sulfide mound. White and yellow on rocks.
2009/05/09 11:55:33	-15.422178	-174.283831	3589	145	10	1527	**Smoker!**
2009/05/09 11:56:33	-15.422099	-174.283707	3591	163	10	1526	Pretty big mound may be all sulfide.
2009/05/09 11:57:10	-15.422086	-174.283669	3593	144	10	1526	Another smoker spotted.
2009/05/09 11:57:55	-15.422027	-174.283613	3594	89	12	1526	Big sulfide spire
2009/05/09 11:58:30	-15.421993	-174.283593	3604	95	12	1525	Active black smokers at base of spire.
2009/05/09 11:59:46	-15.421991	-174.283608	3606	96	13	1525	Getting temperature probe in arm.
2009/05/09 12:00:39	-15.422071	-174.283664	3608	124	9	1527	At least 3 black smoke orifices in view.
2009/05/09 12:02:35	-15.422032	-174.283595	3611	126	9	1524	Several individual black smoke orifices on any given large sulfide mound or spire.
2009/05/09 12:02:52	-15.422050	-174.283599	3612	147	8	1525	Trying to get into position to take temperature reading at an orifice
2009/05/09 12:03:43	-15.422039	-174.283568	3615	150	8	1526	Beautiful spires with smoke coming out at several places.
2009/05/09 12:05:07	-15.422022	-174.283553	3619	156	2	1530	Spooked a fish.
2009/05/09 12:07:52	-15.421995	-174.283607	3622	157	11	1525	Discussing payload and options to get sulfide samples.
2009/05/09 12:08:49	-15.422007	-174.283631	3624	157	11	1526	Replacing temperature probe. Want to try to break up one of the larger rocks.
2009/05/09 12:11:53	-15.421982	-174.283624	3628	158	11	1526	Breaking rock from GeoBox#1
2009/05/09 12:13:34	-15.421977	-174.283613	3631	158	12	1526	Rock is breaking by using both arms. Want to keep the piece in the right hand. Discarding the rest of it.
2009/05/09 12:14:29	-15.421980	-174.283609	3633	157	11	1526	Replacing rock in GeoBox#1
2009/05/09 12:17:20	-15.421987	-174.283608	3637	158	10	1526	Position currently is Lat 15 23.319'S Long 174 17.017'W
2009/05/09 12:20:28	-15.422032	-174.283637	3641	154	2	1530	Extending stbd bio box. Removing marker 149. **DEPLOYING Mkr-149 near base of large sulfide mound with several black smoker finger-chimneys**
2009/05/09 12:23:24	-15.421948	-174.283553	3645	182	10	1526	Marker left at that position.
2009/05/09 12:25:16	-15.422007	-174.283566	3649	188	5	1528	This is a very large mound.
2009/05/09 12:26:46	-15.421982	-174.283535	3651	172	7	1528	Brachyuran crab.
2009/05/09 12:27:49	-15.421995	-174.283543	3653	172	6	1528	Positioning for sampling.
2009/05/09 12:28:10	-15.421998	-174.283545	3655	171	6	1528	Taking other marker out of stbd bio box.
2009/05/09 12:31:18	-15.422036	-174.283575	3659	170	4	1529	Chimney we are trying to get closer to is at the base of wall but there are rocks piled up not far from it. Like parking in a garage.
2009/05/09 12:31:57	-15.422028	-174.283569	3660	171	4	1529	Reaching for a spire next to active chimneys.
2009/05/09 12:32:55	-15.422031	-174.283569	3662	171	4	1529	Breaking off spire.
2009/05/09 12:34:38	-15.422018	-174.283560	3667	171	6	1528	Anna-Louise wants the top part of this sulfide chimney covered with white mat.
2009/05/09 12:37:20	-15.422011	-174.283569	3671	171	6	1528	Moving markers A and E from port biobox. Chimney crumbled. All that's left is the base part that was in the claw
2009/05/09 12:38:54	-15.422014	-174.283567	3673	171	6	1528	SAMPLE Geology. **J416-sulfide-09**. Base of sulfide chimney placed in port bio box. **[Maka sulfide mound]**
2009/05/09 12:39:50	-15.422028	-174.283568	3675	195	4	1528	Markers were dropped. Plan to come back and get them. Needed to make room in biobox.
2009/05/09 12:40:32	-15.422037	-174.283569	3677	195	4	1528	J416-sulfide-09 cont. Position: Lat 15 25.322'S Long 174 17.013'W. Depth=1530m
2009/05/09 12:43:21	-15.422033	-174.283564	3681	213	1	1529	Repositioning to take temperature
2009/05/09 12:45:32	-15.422010	-174.283587	3684	214	1	1529	Poked temp probe into base of chimney for temperature. Tmax=58
2009/05/09 12:47:07	-15.422012	-174.283624	3687	214	1	1529	Scale worms on chimney
2009/05/09 12:48:47	-15.422031	-174.283627	3689	215	1	1529	HDvideo of chimney with scale worms and shrimp with shimmering water in background - nice footage
2009/05/09 12:52:16	-15.422053	-174.283492	3694	211	2	1529	Trying to get temperature in orifice of black smoker chimney. Backing away to try again.
2009/05/09 12:52:46	-15.422055	-174.283478	3695	204	2	1530	Some fallen chimneys around base of wall.
2009/05/09 12:55:00	-15.422070	-174.283472	3698	196	2	1530	Trying to take temperature within orifice of black smoker again.
2009/05/09 12:56:55	-15.422092	-174.283501	3701	197	2	1530	Position is Lat 15 25.325'S Long 174 17.007'W.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 12:58:10	-15.422107	-174.283496	3704	196	2	1530	Broke top off chimney. Flow increased. Can now get temp probe in orifice. Tmax=149.4
2009/05/09 12:58:35	-15.422109	-174.283485	3705	197	2	1530	Temp probe is larger than orifice. Cannot get probe properly inside orifice
2009/05/09 13:00:47	-15.422159	-174.283450	3708	197	2	1530	Trying again. Wiggling probe into orifice. Tmax=158
2009/05/09 13:01:09	-15.422182	-174.283468	3710	197	2	1530	Will take one of each: gastight and major
2009/05/09 13:02:50	-15.422328	-174.283693	3712	196	9	1526	HD is stopped for now
2009/05/09 13:06:07	-15.421508	-174.283812	3715	305	35	1532	**Ship is getting blown off spot. Raised Jason until can reposition.**
2009/05/09 13:20:28	-15.421149	-174.283630	3716	126	74	1531	Watch change Jimmy Varnum at the helm now
2009/05/09 13:30:39	-15.421904	-174.283610	3720	182	18	1531	NAV Doppler reset
2009/05/09 13:32:43	-15.421917	-174.283564	3723	184	7	1531	**Bottom back in view**
2009/05/09 13:34:42	-15.422251	-174.283622	3726	238	7	1530	Tube worms and other animals. Looking for sulfide mound again.
2009/05/09 13:36:29	-15.422337	-174.283613	3729	252	4	1530	Big crabs lurking about tube worm cluster.
2009/05/09 13:36:55	-15.422299	-174.283595	3730	279	3	1529	Orange staining between rocks.
2009/05/09 13:43:26	-15.422135	-174.283769	3738	186	6	1529	Back at sulfide mound.
2009/05/09 13:44:02	-15.422118	-174.283766	3739	185	10	1527	Jason heading is 185. Marker 149 is to the left side. Depth=1529m Alt=10 meters above seafloor.
2009/05/09 13:48:20	-15.422150	-174.283773	3745	160	5	1529	Approaching chimneys to sample major and gastights.
2009/05/09 13:49:03	-15.422082	-174.283720	3746	184	7	1528	Markers A and E sitting on seafloor where dropped. Will pick them up later. Had removed them from biobox to make room for chimney.
2009/05/09 13:49:15	-15.422071	-174.283712	3748	184	8	1527	Picking out chimney to sample.
2009/05/09 13:50:34	-15.422113	-174.283742	3750	177	4	1529	HD recording again.
2009/05/09 13:50:52	-15.422120	-174.283749	3751	178	3	1530	Beautiful cluster of active chimneys.
2009/05/09 13:51:04	-15.422127	-174.283755	3752	177	3	1530	Cluster is near **Marker 149**.
2009/05/09 13:53:42	-15.422188	-174.283808	3756	179	4	1530	Jim is going for the really tall chimney.
2009/05/09 13:54:09	-15.422189	-174.283808	3758	179	4	1530	Has beehive structure at top.
2009/05/09 13:55:24	-15.422182	-174.283800	3761	179	4	1530	Chimney is crumbling as picked up. Lots of smoke coming from everywhere.
2009/05/09 13:56:07	-15.422174	-174.283791	3763	179	4	1530	Trying to put it into port biobox
2009/05/09 13:57:24	-15.422162	-174.283773	3765	179	4	1530	SAMPLE Geology 10. **J416-sulfide-10**. Active sulfide chimney **from sulfide mound at Maka**. Near Marker 149.
2009/05/09 13:58:01	-15.422160	-174.283766	3766	179	4	1530	J416-sulfide-10 cont. Lat 15 25.333'S Long 174 17.027'W.
2009/05/09 13:58:32	-15.422160	-174.283763	3768	179	4	1530	J416-sulfide-10 cont. 1530m depth
2009/05/09 13:59:05	-15.422161	-174.283761	3769	179	4	1530	J416-sulfide-10 cont. Placed in port biobox
2009/05/09 14:00:23	-15.422165	-174.283767	3772	179	4	1530	Knocking off top of another chimney to be able to place temp probe in for temperature reading.
2009/05/09 14:02:12	-15.422161	-174.283783	3775	179	3	1530	Placing temp probe into orifice
2009/05/09 14:03:35	-15.422144	-174.283779	3777	179	3	1530	Tmax=160
2009/05/09 14:04:08	-15.422140	-174.283777	3779	177	5	1529	Moving to look around mound more.
2009/05/09 14:08:12	-15.422159	-174.283760	3785	143	10	1524	Big plume of black smoke. Circling around top of mound. Jason is 17 meters above bottom.
2009/05/09 14:08:27	-15.422179	-174.283773	3786	142	7	1524	Multiple orifices smoking away.
2009/05/09 14:10:02	-15.422192	-174.283780	3789	142	7	1525	Even taller structure in background.
2009/05/09 14:10:34	-15.422206	-174.283788	3791	141	6	1525	Jason opened up larger orifice.
2009/05/09 14:11:09	-15.422210	-174.283789	3793	140	6	1525	Taking temperature in newly opened hole. Lots of black smoke coming out.
2009/05/09 14:12:30	-15.422224	-174.283794	3795	140	6	1525	Temperature probe in orifice near top of mound that Jason opened up.
2009/05/09 14:12:36	-15.422225	-174.283794	3796	140	6	1525	Breaking away more of chimney.
2009/05/09 14:13:17	-15.422230	-174.283796	3798	140	6	1525	Probe in orifice.
2009/05/09 14:14:07	-15.422233	-174.283797	3800	140	6	1525	Not able to get probe truly into hole. Trying again.
2009/05/09 14:14:42	-15.422230	-174.283795	3801	140	6	1525	Tmax=153
2009/05/09 14:16:00	-15.422219	-174.283784	3803	140	6	1525	Broke more off top of chimney off.
2009/05/09 14:16:16	-15.422216	-174.283781	3805	140	6	1525	Continuing to take readings for temperature.
2009/05/09 14:19:32	-15.422193	-174.283770	3809	140	6	1525	Putting probe into area with clear fluid at base before black smoke precipitates. Tmax=315 Depth=1526m

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 14:20:22	-15.422195	-174.283776	3811	140	6	1525	Want to finally get gastight and major samples.
2009/05/09 14:20:51	-15.422194	-174.283778	3812	140	6	1525	Replacing temperature probe.
2009/05/09 14:21:14	-15.422193	-174.283780	3814	140	7	1525	Black major sampler will be first.
2009/05/09 14:22:52	-15.422192	-174.283781	3816	140	7	1525	SAMPLE Fluid 11. **J416-major-11**. Black major sampler. Black smoker orifice at Maka sulfide mound. Clear fluid near orifice before black smoke precipitates out. **[Maka sulfide mound]**
2009/05/09 14:23:27	-15.422196	-174.283782	3818	140	7	1525	J416-major-11 cont. Same orifice with highest temp (315).
2009/05/09 14:24:04	-15.422199	-174.283780	3819	140	7	1525	J416-major-11 cont. Still positioning black major sampler.
2009/05/09 14:24:35	-15.422203	-174.283778	3821	140	7	1525	Frame Grab
2009/05/09 14:25:45	-15.422209	-174.283775	3823	140	7	1525	J416-major-11 cont. Black major sampler triggered.
2009/05/09 14:26:41	-15.422210	-174.283773	3825	140	7	1525	Frame Grab
2009/05/09 14:27:33	-15.422205	-174.283770	3827	140	7	1525	J416-major-11 cont. Sample complete.
2009/05/09 14:28:51	-15.422195	-174.283770	3829	139	7	1525	Replacing Black major. Picking up Green major sampler.
2009/05/09 14:29:46	-15.422188	-174.283771	3831	139	7	1525	SAMPLE Fluid 12. **J416-major-12**. Taking another sample from same orifice. **[Maka sulfide mound]**
2009/05/09 14:30:14	-15.422187	-174.283773	3833	139	7	1525	J416-major-12 cont. Making sure it is placed within orifice
2009/05/09 14:31:09	-15.422189	-174.283778	3835	139	7	1525	J416-major-12 cont. Green major sampler fired.
2009/05/09 14:32:29	-15.422198	-174.283784	3837	139	7	1525	J416-major-12 cont. Sample complete.
2009/05/09 14:33:17	-15.422202	-174.283788	3839	139	7	1525	Replacing Green major sampler into basket
2009/05/09 14:34:32	-15.422202	-174.283793	3841	139	7	1525	Going for the Green gastight GTB2
2009/05/09 14:35:14	-15.422199	-174.283795	3843	139	7	1525	SAMPLE Fluid 13. **J416-GTB-13**. Preparing to sample the same orifice as major samples just completed. **[Maka sulfide mound]**
2009/05/09 14:35:56	-15.422194	-174.283796	3844	139	7	1525	J416-GTB2-13 cont. Placing sampler tube into orifice vent orifice.
2009/05/09 14:36:59	-15.422187	-174.283795	3846	139	7	1525	Stopped HD recording
2009/05/09 14:37:24	-15.422185	-174.283794	3848	139	7	1525	J416-GTB2-13 cont. Smoke is making it a little difficult to see.
2009/05/09 14:38:56	-15.422183	-174.283783	3850	139	7	1525	J416-GTB2-13 cont. Waiting for smoke to clear a little
2009/05/09 14:39:31	-15.422186	-174.283780	3852	140	7	1525	J416-GTB2-13 cont. Sample complete
2009/05/09 14:40:26	-15.422193	-174.283776	3854	140	7	1525	Position for all the samples taken here is Lat 15 25.330'S Long 174 17.026'W
2009/05/09 14:40:46	-15.422195	-174.283776	3855	140	7	1525	Jason depth is 1525 m
2009/05/09 14:41:39	-15.422200	-174.283775	3857	140	7	1525	Dropped Green gastight. Will pick it up after taking the second one.
2009/05/09 14:42:35	-15.422202	-174.283774	3859	140	7	1525	SAMPLE Gas 14. **J416-GTB-14**. Yellow gastight. **[Maka sulfide mound]**
2009/05/09 14:45:01	-15.422196	-174.283764	3862	140	6	1525	J416-GTB11-14 cont. Picking up yellow gastight from basket
2009/05/09 14:47:29	-15.422191	-174.283751	3866	141	7	1525	J416-GTB11-14 cont. Placing yellow gastight into same black smoker orifice as the other green gastight and 2 major samples
2009/05/09 14:48:29	-15.422191	-174.283758	3868	141	7	1525	J416-GTB11-14 cont. Yellow gastight fired
2009/05/09 14:49:04	-15.422192	-174.283768	3869	141	6	1525	J416-GTB11-14 cont. Removing sampler from vent
2009/05/09 14:49:22	-15.422194	-174.283774	3871	141	6	1525	J416-GTB11-14 cont. Replacing yellow gastight into basket.
2009/05/09 14:51:19	-15.422204	-174.283809	3874	142	6	1525	With Jason sitting here at orifices sampling depth is 1526m. Altitude is 19 meters above bottom.
2009/05/09 14:51:42	-15.422160	-174.283780	3875	143	8	1526	Going down to base of mound to look for gastight that was dropped.
2009/05/09 14:52:13	-15.422177	-174.283791	3877	142	4	1528	Gastight spotted.
2009/05/09 14:52:25	-15.422191	-174.283799	3878	142	3	1529	Shrimp and scale worms on side of spire.
2009/05/09 14:52:53	-15.422195	-174.283797	3879	142	3	1529	Gastight sitting on a bit of a ledge. Still 10 meters above bottom according to altimeter.
2009/05/09 14:54:15	-15.422191	-174.283772	3884	141	3	1529	Picking up green gastight that had been dropped.
2009/05/09 14:54:47	-15.422190	-174.283762	3885	141	3	1529	Placing green gastight into basket.
2009/05/09 14:56:37	-15.422191	-174.283755	3888	141	3	1529	Re-adjusting grip. Putting green gastight into basket port forward milk crate where it had originally been.
2009/05/09 14:56:50	-15.422192	-174.283758	3889	141	3	1529	Securing gastights.
2009/05/09 14:57:51	-15.422197	-174.283773	3891	151	3	1529	Big fish.
2009/05/09 14:58:36	-15.422200	-174.283786	3893	154	3	1529	**Jason holding position for filming of animals.**

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 14:59:17	-15.422200	-174.283794	3895	154	3	1529	Fish is a zoarcid fish.
2009/05/09 15:04:28	-15.422161	-174.283761	3901	154	4	1529	Liz is taking hot seat
2009/05/09 15:05:04	-15.422168	-174.283764	3902	155	3	1529	Taking some temperature measurements near animals.
2009/05/09 15:05:59	-15.422180	-174.283769	3904	155	4	1529	Near cluster of shrimp. Tmax=7.0
2009/05/09 15:07:13	-15.422186	-174.283769	3907	155	4	1529	Just a little higher there is a white patch. Tmax=5.8
2009/05/09 15:08:13	-15.422182	-174.283765	3909	154	3	1529	Another cluster of shrimp in the same spot. Tmax=9.2
2009/05/09 15:09:50	-15.422163	-174.283755	3911	154	4	1529	Moved temp probe several cm. Tmax=12.5
2009/05/09 15:10:44	-15.422153	-174.283752	3913	154	3	1529	Stopping HD
2009/05/09 15:11:42	-15.422148	-174.283753	3915	154	3	1529	One more measurement a short distance in same spot. Tmax=6.3
2009/05/09 15:12:02	-15.422149	-174.283755	3916	155	3	1529	Now want to slurp up some of these shrimp.
2009/05/09 15:12:47	-15.422153	-174.283761	3918	155	3	1529	Replaced temp probe.
2009/05/09 15:14:59	-15.422180	-174.283783	3921	155	3	1529	SAMPLE Biology 15. **J416-shrimp-15**. Suction sample of shrimp from side wall of sulfide spire at Maka. Going into blue chamber. **[Maka sulfide mound - FAILED]**
2009/05/09 15:15:34	-15.422183	-174.283786	3923	155	3	1529	J416-shrimp-15 cont. Hose is not connected to chamber.
2009/05/09 15:17:08	-15.422156	-174.283766	3926	155	3	1529	J416-shrimp-15 cont. NO SAMPLE.
2009/05/09 15:17:36	-15.422137	-174.283749	3927	155	3	1529	Marv back in hot seat.
2009/05/09 15:18:19	-15.422097	-174.283711	3929	159	6	1528	Want to head back to top of spire that's been in the background while doing the gastight and major samples.
2009/05/09 15:19:33	-15.422277	-174.283804	3931	237	3	1525	There is a huge black plume between the spires.
2009/05/09 15:20:00	-15.422227	-174.283756	3932	235	1	1527	Flashing seen at base of this plume.
2009/05/09 15:20:25	-15.422221	-174.283741	3934	229	1	1527	Marv thinks it is the clear water part of the plume.
2009/05/09 15:20:46	-15.422224	-174.283735	3935	230	1	1527	This plume is really chugging away.
2009/05/09 15:22:17	-15.422211	-174.283711	3938	215	2	1527	Impressive flow rate here. Not sure if we can get close enough to sample and still have visibility.
2009/05/09 15:23:23	-15.422217	-174.283727	3940	215	2	1527	Flashes are absence of black. There is white on background behind plume.
2009/05/09 15:24:04	-15.422218	-174.283738	3941	215	2	1527	Removing temperature probe to get reading.
2009/05/09 15:24:48	-15.422216	-174.283745	3943	215	2	1527	Jason heading is 215.
2009/05/09 15:25:21	-15.422214	-174.283746	3945	215	2	1527	Taking temperature reading
2009/05/09 15:26:59	-15.422207	-174.283735	3947	215	3	1527	Tmax=258.
2009/05/09 15:32:51	-15.422196	-174.283738	3954	215	2	1527	Trying another spot within the vent. Broke off edge a little to open up hole.
2009/05/09 15:33:27	-15.422185	-174.283726	3956	215	2	1527	Abandoning temperature reading. Appears to be too much mixing right at opening to get good temperature.
2009/05/09 15:33:35	-15.422184	-174.283724	3957	215	2	1527	HD recording
2009/05/09 15:35:13	-15.422260	-174.283757	3960	268	4	1523	Continue moving around structure.
2009/05/09 15:36:15	-15.422299	-174.283765	3962	268	7	1520	Now looking at taller spire. This is the one that was visible in background while we were sampling the majors and gastights.
2009/05/09 15:36:39	-15.422275	-174.283742	3963	249	7	1520	Lots of smoke coming out the top of this one too. Many individual orifices.
2009/05/09 15:37:13	-15.422263	-174.283726	3965	249	6	1520	Shrimp all over the sides of this spire.
2009/05/09 15:38:53	-15.422290	-174.283735	3967	318	5	1520	Trying to find a place to sample. Plume is thick and inhibiting visibility.
2009/05/09 15:39:59	-15.422271	-174.283727	3969	338	4	1520	Taking temperature probe out of basket
2009/05/09 15:42:55	-15.422266	-174.283747	3973	338	4	1520	Still having trouble getting good temperature from these vents.
2009/05/09 15:44:30	-15.422283	-174.283764	3976	338	4	1520	Preparing to pluck an active chimney for Anna-Louise.
2009/05/09 15:45:47	-15.422277	-174.283755	3978	337	4	1520	Missed stbd biobox. NO SAMPLE
2009/05/09 15:46:29	-15.422253	-174.283733	3980	338	4	1520	SAMPLE Biology 16. **J416-sulfide-16**. Trying again to get a sample of an active chimney for Anna-Louise. - **[Maka sulfide mound - FAILED]**
2009/05/09 15:49:27	-15.422327	-174.283741	3984	235	10	1516	Looking around for another place to sample.
2009/05/09 15:51:12	-15.422271	-174.283700	3987	268	4	1522	Large sulfide mound with small inactive chimneys on slope.
2009/05/09 15:52:39	-15.422159	-174.283650	3989	261	2	1526	Large black plume coming from base of another mound within this field.
2009/05/09 15:55:41	-15.422208	-174.283731	3993	259	1	1527	Attempting to take another temperature.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 15:56:52	-15.422199	-174.283726	3995	259	1	1527	Hairy crab in HD.
2009/05/09 15:57:57	-15.422199	-174.283721	3997	260	1	1527	The crab has a lot of bacterial hair on it. Looks similar to other crabs on Lau.
2009/05/09 15:58:43	-15.422211	-174.283723	3999	260	1	1527	Tmax was about 219 but Marv says that is not a real number.
2009/05/09 15:59:16	-15.422228	-174.283730	4001	260	1	1527	Liz thinks it is the genus Paralomis possibly.
2009/05/09 16:01:28	-15.422229	-174.283744	4004	242	3	1526	Moving around the sulfides.
2009/05/09 16:01:48	-15.422215	-174.283738	4005	231	2	1528	Finding a new position for taking some fluid samples.
2009/05/09 16:02:12	-15.422248	-174.283768	4006	252	2	1528	HD Cam has been on since we saw the crab.
2009/05/09 16:03:02	-15.422245	-174.283783	4008	247	2	1528	Looks like chimlettes or pipes with black smoke coming out
2009/05/09 16:03:45	-15.422224	-174.283780	4010	247	2	1528	Taking the temperature of one of these pipes.
2009/05/09 16:05:19	-15.422205	-174.283779	4013	247	2	1528	VIDEO Stop recording HDCam.
2009/05/09 16:05:32	-15.422207	-174.283781	4014	247	2	1528	The orifice is just too small to get a good sample here.
2009/05/09 16:07:10	-15.422172	-174.283774	4016	212	4	1528	Lots of pipes looks like an organ.
2009/05/09 16:07:19	-15.422147	-174.283759	4018	202	6	1528	Marker 149 in sight.
2009/05/09 16:07:57	-15.422150	-174.283772	4019	120	9	1527	We are still trying to figure out where to sample our last major and gastight.
2009/05/09 16:10:53	-15.422246	-174.283889	4023	163	7	1525	We are setting up for another sample of the black smoker.
2009/05/09 16:11:09	-15.422243	-174.283886	4024	162	7	1525	This is where we previously got a temperature of 315.
2009/05/09 16:11:48	-15.422232	-174.283870	4026	163	7	1525	We never stopped recording HDCam at 1605 but decided to stop it now instead.
2009/05/09 16:11:53	-15.422230	-174.283867	4027	162	7	1525	VIDEO Stop recording HDCam.
2009/05/09 16:12:42	-15.422216	-174.283839	4029	163	7	1525	Starting with Red Major.
2009/05/09 16:13:34	-15.422207	-174.283808	4031	163	7	1525	SAMPLE Fluid 17. **J416-major-17**. Red Major at side of Maka sulfide structure where temperature was previously 315 C. **[Maka sulfide mound]**
2009/05/09 16:13:57	-15.422207	-174.283798	4032	163	7	1525	J416-major-17 cont. Lat 15 25.332'S 174 17.028'W for these samples.
2009/05/09 16:14:12	-15.422207	-174.283791	4033	163	7	1525	J416-major-17 cont. Depth=1526m.
2009/05/09 16:15:00	-15.422215	-174.283780	4035	163	7	1525	We can really see the fluid pouring out the bottle meaning it looks like a good sample.
2009/05/09 16:15:20	-15.422220	-174.283779	4037	163	7	1525	Returning red major sampler to basket.
2009/05/09 16:16:03	-15.422230	-174.283780	4038	163	7	1525	SAMPLE Fluid 18. **J416-major-18**. Yellow Major at side of Maka sulfide structure where temperature was previously 315 C. **[Maka sulfide mound]**
2009/05/09 16:16:29	-15.422236	-174.283783	4040	163	7	1525	J416-major-18 cont. Can see the fluid pouring out of the bottle.
2009/05/09 16:18:13	-15.422240	-174.283800	4042	163	7	1525	J416-major-18 cont. Yellow Major is complete and we are storing the bottle in the basket.
2009/05/09 16:19:46	-15.422221	-174.283804	4045	164	7	1525	SAMPLE Fluid Gas Getting set for a gastight sample in the same place.
2009/05/09 16:20:24	-15.422212	-174.283801	4047	164	7	1525	SAMPLE Gas 19. **J416-GTB-19**.Those majors were J416-Majors-17 and 18. **[Maka sulfide mound]**
2009/05/09 16:20:39	-15.422209	-174.283799	4048	164	7	1525	J416-gas-19 cont. This is the orange gastight.
2009/05/09 16:21:10	-15.422206	-174.283797	4049	163	7	1525	SAMPLE Gas J416-gas-19 cont. Same spot on side of Maka sulfide structure.
2009/05/09 16:21:22	-15.422204	-174.283795	4051	163	7	1525	J416-gas-19 cont. Fired sample.
2009/05/09 16:21:41	-15.422201	-174.283792	4052	163	7	1525	VIDEO Start recording HDCam.
2009/05/09 16:22:39	-15.422201	-174.283790	4054	164	7	1525	Putting orange gastight back into basket.
2009/05/09 16:22:44	-15.422201	-174.283790	4055	164	7	1525	VIDEO Stop recording HDCam.
2009/05/09 16:24:41	-15.422200	-174.283802	4058	164	7	1525	Preparing to take gastight black and white.
2009/05/09 16:29:01	-15.422218	-174.283776	4063	166	7	1525	SAMPLE Gas Having a little trouble figuring out where we took the others compared to now due to poor visibility.
2009/05/09 16:29:54	-15.422219	-174.283765	4065	166	7	1525	SAMPLE Gas **J416-GTB-20** Taking gastight black and white at same spot on **side of Maka sulfide structure.**
2009/05/09 16:30:13	-15.422219	-174.283763	4066	166	7	1525	J416-GTB5-20 cont. Sample complete.
2009/05/09 16:30:20	-15.422218	-174.283762	4068	166	7	1525	We are all done with fluid sampling.
2009/05/09 16:31:01	-15.422215	-174.283763	4069	166	7	1525	We are now going to do some HDCam around this structure.
2009/05/09 16:31:31	-15.422211	-174.283765	4071	165	7	1525	Gastight stored back in basket.
2009/05/09 16:33:26	-15.422200	-174.283785	4074	166	7	1525	VIDEO Start recording HDCam.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 16:33:40	-15.422198	-174.283786	4075	166	7	1525	Doing a survey of this sulfide structure with HDCam.
2009/05/09 16:37:44	-15.422179	-174.283765	4080	166	7	1525	Still doing HDCam survey.
2009/05/09 16:39:35	-15.422171	-174.283786	4083	162	7	1526	We are going to pick up the 2 markers we dropped accidentally ("A" and "E") previously.
2009/05/09 16:40:14	-15.422169	-174.283794	4084	175	6	1529	Bringing out the starboard swingarm.
2009/05/09 16:41:09	-15.422212	-174.283828	4086	182	3	1531	Nice little chimlet with white clear smoke coming out.
2009/05/09 16:43:49	-15.422181	-174.283768	4090	182	3	1530	Picking up Markers A and E.
2009/05/09 16:44:05	-15.422182	-174.283766	4091	182	3	1530	Scale worm on the chimlet.
2009/05/09 16:46:02	-15.422208	-174.283771	4094	183	3	1530	We are still trying to put away the markers in the starboard biobox.
2009/05/09 16:49:18	-15.422193	-174.283771	4099	182	3	1530	Watching the furry scaleworm on the chimlet.
2009/05/09 16:49:27	-15.422191	-174.283770	4100	182	3	1530	We are doing a ballast check.
2009/05/09 16:51:56	-15.422186	-174.283764	4103	182	7	1527	Looks like we still have some payload left so we are going to try to sample the chimlet.
2009/05/09 16:54:14	-15.422184	-174.283759	4106	175	4	1530	The HDCam is on the chimlet that we want.
2009/05/09 16:56:04	-15.422186	-174.283764	4109	181	3	1531	There are crabs shrimps scale worms in the background.
2009/05/09 16:56:15	-15.422186	-174.283764	4110	181	3	1531	Putting Markers A and E out again.
2009/05/09 16:57:28	-15.422196	-174.283766	4113	181	3	1531	We are now going to try to get this chimlet.
2009/05/09 16:58:22	-15.422205	-174.283766	4115	181	3	1531	The chimlet fell and now we see black smoke.
2009/05/09 16:58:35	-15.422207	-174.283765	4116	181	3	1531	The chimlet is lying off to the side and we will try to pick it up.
2009/05/09 16:58:44	-15.422208	-174.283766	4117	181	3	1531	It is very fragile.
2009/05/09 16:59:05	-15.422212	-174.283766	4118	181	3	1531	We are trying to pick it up.
2009/05/09 16:59:24	-15.422215	-174.283767	4120	181	3	1531	We have the chimlet.
2009/05/09 17:00:13	-15.422217	-174.283769	4121	181	3	1531	SAMPLE Geology **J416-sulfide-21**. The chimlet is going in the starboard biobox **[Maka sulfide mound]**
2009/05/09 17:00:26	-15.422217	-174.283769	4123	181	3	1531	This sulfide is J416-sulfide-21.
2009/05/09 17:01:42	-15.422210	-174.283772	4125	181	3	1531	J416-sulfide-21 cont. Lat 15 25.335'S Long 174 17.027'W. Depth=1532m
2009/05/09 17:02:18	-15.422205	-174.283773	4127	181	3	1531	We are now getting the markers (A and E) again.
2009/05/09 17:03:16	-15.422193	-174.283768	4128	181	3	1531	We are hanging onto the markers in the port arm.
2009/05/09 17:03:48	-15.422184	-174.283761	4130	173	3	1530	We are now going to take a temperature of the remaining hole where the chimlet was.
2009/05/09 17:06:18	-15.422207	-174.283777	4134	171	3	1530	Doing the temperature measurement.
2009/05/09 17:06:53	-15.422216	-174.283784	4135	171	4	1530	Tmax=132.
2009/05/09 17:07:07	-15.422222	-174.283789	4136	171	3	1530	Now we are going to tubeworms.
2009/05/09 17:07:38	-15.422236	-174.283799	4138	172	3	1530	In the HDcam we can see different types of shrimp and they are fighting.
2009/05/09 17:08:33	-15.422195	-174.283770	4140	165	6	1529	We are going downhill to find the tubeworms.
2009/05/09 17:08:47	-15.422183	-174.283761	4141	166	7	1529	The chimlet is for Anna Louise.
2009/05/09 17:09:29	-15.422183	-174.283756	4143	168	7	1529	Nice wide view of the sulfide mound.
2009/05/09 17:10:11	-15.422164	-174.283736	4144	222	5	1529	VIDEO Stop recording HDCam.
2009/05/09 17:11:28	-15.422165	-174.283717	4147	222	8	1523	Nice wide view of the black smokers.
2009/05/09 17:12:39	-15.422278	-174.283769	4149	222	4	1523	We are transiting southwest towards tube worm and mussel patches.
2009/05/09 17:12:47	-15.422295	-174.283778	4150	222	4	1523	We made a smoky mess.
2009/05/09 17:14:26	-15.422342	-174.283781	4153	220	9	1518	Bottom back in sight.
2009/05/09 17:17:16	-15.422402	-174.283884	4156	212	10	1518	Looking for tube worms.
2009/05/09 17:17:31	-15.422392	-174.283883	4158	211	9	1520	Depth we are looking for is 1550m.
2009/05/09 17:18:28	-15.422371	-174.283881	4160	193	6	1524	Big bush of tube worms now in view.
2009/05/09 17:18:50	-15.422367	-174.283875	4161	170	4	1524	VIDEO Start recording HDCam.
2009/05/09 17:19:14	-15.422394	-174.283883	4162	84	7	1525	We are about 25 degrees SW of the large sulfide mound.
2009/05/09 17:20:13	-15.422392	-174.283848	4164	71	3	1527	Vent fish and crabs in this tube worm bunch.
2009/05/09 17:20:18	-15.422388	-174.283842	4166	71	3	1527	Trying to figure out if they are alive.
2009/05/09 17:20:57	-15.422367	-174.283801	4167	69	3	1527	We don't see any red plumes so are assuming they are dead.
2009/05/09 17:21:03	-15.422379	-174.283805	4168	68	3	1527	Continuing into deeper water.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 17:21:52	-15.422715	-174.284020	4170	202	3	1528	This looks like microbial mat very thick and white.
2009/05/09 17:22:41	-15.422652	-174.283993	4172	308	3	1531	Rocks are speckled with crabs.
2009/05/09 17:22:58	-15.422641	-174.284000	4173	308	2	1532	There are also some mussels in there.
2009/05/09 17:23:20	-15.422619	-174.284013	4175	306	1	1533	A few big crabs and a ton of small crabs.
2009/05/09 17:23:58	-15.422516	-174.284008	4176	327	1	1536	This is a very extensive area of animals.
2009/05/09 17:24:52	-15.422399	-174.284040	4178	327	2	1538	Some tube worms in view.
2009/05/09 17:25:15	-15.422391	-174.284083	4179	358	2	1540	There are a ton of mussels.
2009/05/09 17:26:15	-15.422467	-174.284244	4181	30	3	1539	Going to do a HD transect of the worms and mussels with lasers and then collect them.
2009/05/09 17:26:54	-15.422465	-174.284288	4183	47	3	1540	We think these are healthy and alive worms.
2009/05/09 17:28:00	-15.422499	-174.284333	4185	68	3	1540	We are starting the HDcam transect now.
2009/05/09 17:28:53	-15.422457	-174.284287	4187	68	4	1541	We are at a depth of 1542m.
2009/05/09 17:30:36	-15.422364	-174.284166	4190	68	4	1543	Now we are a depth of 1544m.
2009/05/09 17:31:35	-15.422455	-174.284206	4192	69	3	1541	We don't see much in terms of fluid flow but given all the animals we assume it is there.
2009/05/09 17:33:07	-15.422469	-174.284195	4194	97	3	1541	Landing in front of a tubeworm bunch.
2009/05/09 17:33:55	-15.422452	-174.284176	4196	93	3	1541	We can see a plume of one of the tubeworms.
2009/05/09 17:34:50	-15.422438	-174.284159	4198	76	4	1540	Repositioning for sampling the tubeworm bush.
2009/05/09 17:37:05	-15.422435	-174.284164	4201	80	3	1541	Opening the starboard biobox.
2009/05/09 17:37:59	-15.422440	-174.284178	4203	80	3	1541	SAMPLE Biology **J416-tubeworms-22** Tubeworm grab for Liz and Tim. **[SW of sulfide mound near Mkr-E]**
2009/05/09 17:38:06	-15.422441	-174.284180	4204	80	3	1541	J416-Biology-22 cont. Depth=1542 m
2009/05/09 17:38:20	-15.422443	-174.284184	4206	80	3	1541	J416-Biology-22 cont. Lat 15 25.345'S Long 174 17.051'W
2009/05/09 17:38:38	-15.422447	-174.284190	4207	79	3	1541	Trying to stuff it in the starboard biobox.
2009/05/09 17:39:34	-15.422464	-174.284208	4209	80	3	1540	We are about 50m at 240deg from the large sulfide mound.
2009/05/09 17:39:54	-15.422470	-174.284213	4210	80	3	1541	VIDEO Stop recording HDCam.
2009/05/09 17:41:23	-15.422491	-174.284225	4213	80	3	1540	The bush we got is too big for the biobox.
2009/05/09 17:41:54	-15.422495	-174.284227	4214	79	3	1540	Put down markers A and E.
2009/05/09 17:42:13	-15.422498	-174.284229	4215	80	3	1540	Trying to pull the tube worm bush apart.
2009/05/09 17:42:44	-15.422501	-174.284230	4217	80	3	1540	Roots of tube worms all tied together.
2009/05/09 17:43:24	-15.422499	-174.284230	4219	79	3	1540	Trying again to put it in the starboard biobox with markers and a chimlet sulfide.
2009/05/09 17:44:01	-15.422496	-174.284229	4220	80	4	1540	Sample J416-Biology-22 is complete and stored in the starboard biobox.
2009/05/09 17:44:38	-15.422490	-174.284227	4222	80	3	1540	That sample is done.
2009/05/09 17:45:58	-15.422475	-174.284217	4224	77	4	1540	**We are DEPLOYING marker E here at the tubeworm bush sampling site..**
2009/05/09 17:47:11	-15.422518	-174.284248	4226	123	3	1540	Looking for a good spot to scoop some mussels.
2009/05/09 17:48:48	-15.422488	-174.284241	4229	152	2	1540	HD Cam is going on and off in this area.
2009/05/09 17:49:04	-15.422488	-174.284245	4230	152	2	1540	Beautiful bunch of mussels and crabs.
2009/05/09 17:49:33	-15.422490	-174.284251	4232	152	2	1540	Setting Marker A down while we collect the mussels.
2009/05/09 17:50:40	-15.422490	-174.284257	4234	151	2	1540	Picking up a scoop bag.
2009/05/09 17:51:03	-15.422493	-174.284258	4235	151	2	1540	The scoop bag has yellow tape.
2009/05/09 17:52:39	-15.422522	-174.284254	4238	152	2	1540	SAMPLE Biology **J416-mussels-23** is a scoop of mussels for Liz and Tim. Depth=1541m. Lat 15 25. 348'S Long 174 17.055'W **[SW of Maka sulfide mound at Mkr-A]**
2009/05/09 17:53:46	-15.422554	-174.284249	4240	83	3	1540	Lots of squat lobsters swimming about as we stir things up.
2009/05/09 17:54:00	-15.422554	-174.284245	4241	51	2	1541	J416-Biology-23 cont. We are still trying to collect a patch of mussels and are repositioning.
2009/05/09 17:56:21	-15.422540	-174.284228	4245	111	2	1541	J416-Biology-23 cont. Still trying to get some mussels.
2009/05/09 17:57:38	-15.422505	-174.284222	4247	111	2	1541	J416-Biology-23 cont. Looks like we got some this time.
2009/05/09 18:00:08	-15.422499	-174.284216	4250	110	2	1541	VIDEO Stop recording HDCam.
2009/05/09 18:01:34	-15.422509	-174.284200	4253	111	2	1541	J416-Biology-23 cont. We are going to try picking some up with the starboard arm and dropping them in the scoop bag.
2009/05/09 18:03:20	-15.422507	-174.284189	4256	112	2	1541	J416-Biology-23 cont. I think we got 2 in there and are still trying for more.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J416 log comments (NELSC and Maka)
2009/05/09 18:05:27	-15.422509	-174.284195	4259	112	2	1541	We need to come up so the sample is over.
2009/05/09 18:05:55	-15.422515	-174.284202	4260	112	2	1541	J416-Biology-23 cont. We are storing the scoop bag .
2009/05/09 18:08:33	-15.422756	-174.284397	4264	2	11	1529	**We left Marker A down there (site of mussel sampling J416-23).**
2009/05/09 18:09:09	-15.422952	-174.284541	4265	0	17	1524	Tether management.
2009/05/09 18:10:51	-15.422266	-174.284286	4268	320	30	1518	JASON off bottom.
2009/05/09 19:10:09						2	Medea on deck.
2009/05/09 19:17:12						1	JASON on deck.
2009/05/09 19:17:20						1	End of Dive J2-416.

J2-417 Dive Log

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 05:01:55			4272	353	178	3	JASON in water
2009/05/10 05:04:35			4273	290	180	2	Medea in water.
2009/05/10 05:06:30			4274	297	198	33	Heading down.
2009/05/10 05:27:52			4275	239	106	639	Frame Grab
2009/05/10 05:34:43			4276	297	174	806	Frame Grab
2009/05/10 05:43:58			4277	282	81	1071	Tools: Vent fluid sampler. 4 small scoop bags. 4 gas tights. 2 Davis samplers. Single chamber suction sampler.
2009/05/10 05:44:23			4278	284	70	1083	Tasks: Traverse from SE along rift zone. Sample rocks. Other.
2009/05/10 05:44:46			4279	284	78	1094	Tasks cont. Go to Hades and see if can sample fluids in the vicinity.
2009/05/10 05:45:10			4280	285	123	1104	Tasks cont. Vent fluid sampling of diffuse vents and Prometheus.
2009/05/10 05:45:19			4281	290	75	1108	Opportunistic sampling of biology and geology.
2009/05/10 05:45:32			4282	285	79	1116	Tasks cont. Back to Hades?
2009/05/10 05:48:25			4283	280	119	1196	Basket: 2 gas tights. 2 Davis scoops. 5 markers. 4 small scoop bags. HFS wand. Suction hose.
2009/05/10 05:50:08	-15.101746	-173.757611	4284	281	86	1234	Julie is measuring H2S in the plume as we descend. Started to see the plume about 300m off the bottom.
2009/05/10 05:58:50	-15.096429	-173.750459	4287	58	5	1324	JASON on bottom. Bottom in sight.
2009/05/10 05:59:24	-15.096430	-173.750463	4288	58	3	1325	Depth=1325m
2009/05/10 05:59:56	-15.096425	-173.750464	4290	57	3	1324	Dropping a couple weights.
2009/05/10 06:02:59	-15.096439	-173.750477	4294	57	2	1325	Doing a bit of housekeeping.
2009/05/10 06:03:17	-15.096443	-173.750475	4295	58	3	1325	Heading up slope.
2009/05/10 06:08:49	-15.096416	-173.750475	4302	311	7	1319	Correction - we are still here in the spot we touched down.
2009/05/10 06:09:01	-15.096410	-173.750482	4303	312	7	1319	Going to collect a rock.
2009/05/10 06:10:35	-15.096412	-173.750490	4306	354	5	1320	Intact lavas here. Pillows with a little bit of staining. Pretty young stuff.
2009/05/10 06:10:54	-15.096413	-173.750490	4307	353	5	1320	Sample on lavas that may have had a lot of low temp fluids going off them. Staining.
2009/05/10 06:11:59	-15.096420	-173.750489	4309	354	5	1320	SAMPLE Geology 1. **J417-rock-01**. Piece of pillow fragment a little bit of staining on one face. Shaped like a wedge of pie. **(S of SW ridge crest)**
2009/05/10 06:13:17	-15.096421	-173.750490	4311	1	9	1315	J417-rock-01 cont. Lat 15 5.785'S Long 173 45.029'W Depth=1326m. Looks like a big flow front of pillow lavas. PI Rubin.
2009/05/10 06:14:06	-15.096389	-173.750515	4313	1	15	1303	This flow had been building fast. Lots of broken pillow tips. Observed this on a smaller scale at Hades. The ridge is covered with volcaniclastics.
2009/05/10 06:14:54	-15.096310	-173.750475	4315	356	13	1296	It's a vertical wall of pillows. We're on top of this. It's trending northeast.
2009/05/10 06:15:07	-15.096281	-173.750458	4316	356	13	1295	This is a big vertical scarp that is part of the collapse wall.
2009/05/10 06:15:43	-15.096233	-173.750444	4318	357	9	1290	Now we're on top of the big series of pillow flows.
2009/05/10 06:16:06	-15.096219	-173.750451	4319	358	10	1288	Big flatter lavas at the top here. Large pillow flow feature.
2009/05/10 06:17:15	-15.096139	-173.750419	4321	359	3	1287	Could sample here and have a section of the chemistry and how it changed on this feature. The wall was about 80m high.
2009/05/10 06:18:11	-15.096135	-173.750414	4323	358	2	1288	Plan to sample this flow at the top of this pillow flow.
2009/05/10 06:19:42	-15.096146	-173.750414	4326	356	2	1288	SAMPLE Geology 2. **J417-rock-02**. Flat sample from this pillow. Glassy plate. Vesicular. Fresh and oxidized a little bit on the surface. Lots of glass. **(S of SW ridge crest)**
2009/05/10 06:21:05	-15.096143	-173.750411	4328	357	2	1288	J417-rock-02 cont. Depth=1289m. Sample is in both 7B and 8B boxes. Lat 15 5.770'S Long 173 45.025'W. Want to look at the chemistry of this huge pillow flow from the base to the top.
2009/05/10 06:21:32	-15.096140	-173.750410	4330	359	4	1287	Beautiful pillows here.
2009/05/10 06:21:42	-15.096137	-173.750412	4331	359	5	1285	Continuing up the ridge to the top of West Mata.
2009/05/10 06:22:16	-15.096093	-173.750416	4332	358	5	1282	This is a huge area of diffuse venting with tons of white mat here.
2009/05/10 06:22:20	-15.096089	-173.750417	4333	358	5	1282	VIDEO Start recording HDCam

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 06:23:04	-15.096072	-173.750503	4335	359	6	1281	This is a huge expanse of bacterial mat on the top of this pillow mound.
2009/05/10 06:23:40	-15.096028	-173.750593	4337	4	7	1280	Gradient of orange and white.
2009/05/10 06:24:27	-15.095985	-173.750656	4339	6	5	1281	We want to get an idea of how large this area is. It's very extensive. Huge…
2009/05/10 06:24:52	-15.095981	-173.750625	4340	8	5	1281	We're at the ridge crest here. There is mat as far as we can see.
2009/05/10 06:26:35	-15.095994	-173.750492	4343	9	4	1280	There must be a bit of sediment under this. At the lip there could have been a bit of lobate flow and then seds covered with mat (?).
2009/05/10 06:26:43	-15.095995	-173.750481	4344	9	4	1280	Is it mat or is it sulfur?
2009/05/10 06:27:10	-15.095999	-173.750444	4345	10	4	1279	It's a massive field of whatever it is?
2009/05/10 06:28:14	-15.096011	-173.750376	4347	9	4	1279	Little collapse pit in the sand here and ripples. A bit winnowed.
2009/05/10 06:28:29	-15.096012	-173.750356	4349	9	3	1279	Rick is convinced that the white stuff we are seeing is mat.
2009/05/10 06:28:59	-15.096010	-173.750346	4350	10	2	1280	Muco-polysaccharides are the biofilm that holds this stuff together.
2009/05/10 06:29:54	-15.096018	-173.750329	4352	4	3	1279	We created a landslide by just getting near to it. Lots of black volcaniclastic seds under this mat.
2009/05/10 06:31:19	-15.096017	-173.750419	4354	15	5	1279	You can see the pillows or lobates under the volcaniclastic seds and mat or sulfur coating - whatever it is.
2009/05/10 06:32:38	-15.096012	-173.750418	4357	16	4	1279	Starboard manipulator has a ground fault. No temp probe. Can only do that a couple times.
2009/05/10 06:32:47	-15.096012	-173.750417	4358	16	4	1279	VIDEO Stop recording HDCam
2009/05/10 06:34:36	-15.096012	-173.750409	4361	16	4	1279	Discussing what we can do on this dive. Will have to do everything left-handed.
2009/05/10 06:35:29	-15.096012	-173.750481	4363	18	4	1279	Starboard manipulator has a hard ground.
2009/05/10 06:36:05	-15.096019	-173.750506	4364	41	5	1279	VIDEO Start recording HDCam
2009/05/10 06:37:16	-15.096014	-173.750512	4366	42	5	1279	Zooming in with the HD Cam to look at the mat close up and personal.
2009/05/10 06:37:29	-15.096013	-173.750513	4368	42	5	1279	VIDEO Stop recording HDCam
2009/05/10 06:39:08	-15.095995	-173.750511	4370	42	5	1279	Setting up to sample this mat with one of Rick's samplers.
2009/05/10 06:40:36	-15.095981	-173.750496	4373	42	5	1279	Jason is opening up the sampler.
2009/05/10 06:41:01	-15.095980	-173.750493	4374	42	5	1279	This is Davis sampler #1.
2009/05/10 06:42:35	-15.096002	-173.750488	4377	42	4	1281	We're putting a target in here called **"Mat Meadow"**. It's like a field of mat (or sulfur?)
2009/05/10 06:42:55	-15.096004	-173.750489	4378	41	3	1282	VIDEO Start recording HDCam for Rick's mat sampling.
2009/05/10 06:43:40	-15.096011	-173.750489	4380	41	2	1282	Going for the red stuff now. If it's mat it contains iron oxides.
2009/05/10 06:46:02	-15.096024	-173.750495	4383	41	2	1282	SAMPLE Biology 3. **J417-mat-03**. Depth=1285m. Lat 15 5.761'S Long 173 45.030'W. **Mat Meadow** USBL fix. Sampler #1.
2009/05/10 06:46:42	-15.096021	-173.750495	4385	41	2	1282	J417-mat-03 cont. Sampler with lots of red mat and possibly some white. There is probably plenty of volcaniclastic seds in there as well.
2009/05/10 06:49:48	-15.096011	-173.750497	4389	41	2	1282	Messing around with the manipulator. It probably won't be a good sample because it is not totally closed.
2009/05/10 06:50:52	-15.096019	-173.750498	4391	41	2	1282	We think we see some shimmer coming up through the sands.
2009/05/10 06:55:59	-15.096021	-173.750493	4397	41	2	1282	Tito is trying to shut the sampler - Rick thinks that it is probably still open.
2009/05/10 06:56:46	-15.096021	-173.750496	4399	41	2	1282	Next we will try to get some of the white mat in the next sampler.
2009/05/10 06:58:23	-15.096054	-173.750452	4401	42	5	1280	These are low biomass communities so it needs to be closed so that the high biomass stuff in the water column don't contaminate the sample.
2009/05/10 07:00:53	-15.096064	-173.750429	4405	35	5	1281	VIDEO Start recording HDCam This is Mat Meadow.
2009/05/10 07:02:49	-15.096026	-173.750425	4408	32	2	1282	Looking for a spot to sit down to sample white mat
2009/05/10 07:04:08	-15.096019	-173.750426	4410	33	2	1282	Preparing to take sample
2009/05/10 07:04:31	-15.096020	-173.750426	4412	33	2	1282	VIDEO Stop recording HDCam
2009/05/10 07:05:45	-15.096025	-173.750423	4414	32	2	1282	SAMPLE Biology **J417-Mat-04**. Scoop 2. Lat 15 5.762'S Long 173 45.026'W. Depth=1283m. **(Mat Meadow Area)**
2009/05/10 07:06:15	-15.096029	-173.750422	4415	32	2	1282	Scooping white top with black pyroclastic sand beneath
2009/05/10 07:06:30	-15.096032	-173.750421	4417	33	2	1282	J417-Mat-04 cont. Sample done

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 07:06:37	-15.096032	-173.750421	4418	33	2	1282	Going to try to gently close the sampler
2009/05/10 07:10:47	-15.096031	-173.750421	4423	33	2	1281	Taking temperature in white sediment. Probe inserted 14 cm into sediment.
2009/05/10 07:11:30	-15.096027	-173.750423	4425	33	2	1281	Temp increases to T=21.
2009/05/10 07:13:13	-15.096026	-173.750425	4427	33	2	1281	Temp probe is pushed completely into sediment. Temp is slowly climbing reaching Tmax=25.2
2009/05/10 07:14:42	-15.096028	-173.750423	4430	33	2	1281	This area of sediment covers a few hundred square meters.
2009/05/10 07:16:05	-15.096028	-173.750416	4432	32	2	1281	Continuing up slope to Red Rock Ridge.
2009/05/10 07:17:18	-15.096006	-173.750416	4434	14	3	1279	Heading 012.5. Still on white mat. Ambient temp=4.6
2009/05/10 07:18:34	-15.095954	-173.750418	4437	13	2	1278	Small depression near the top of the ridge.
2009/05/10 07:19:03	-15.095934	-173.750416	4438	16	2	1276	Nascent collapse in volcaniclastic material.
2009/05/10 07:20:04	-15.095931	-173.750412	4440	16	3	1276	Looking for diffuse flow.
2009/05/10 07:20:49	-15.095915	-173.750402	4442	19	1	1278	Black sediment dusted with white and yellow green mat.
2009/05/10 07:21:03	-15.095918	-173.750401	4443	19	2	1277	No diffuse flow.
2009/05/10 07:21:33	-15.095910	-173.750379	4445	22	2	1276	Sediment field continues. Large pit.
2009/05/10 07:21:41	-15.095911	-173.750369	4446	23	2	1276	NAV Doppler reset
2009/05/10 07:22:35	-15.095886	-173.750398	4448	3	2	1276	Continuing up ridge heading 004.4
2009/05/10 07:23:22	-15.095867	-173.750460	4449	5	2	1276	Smooth sediment cover with mat.
2009/05/10 07:23:27	-15.095861	-173.750461	4450	5	2	1276	VIDEO Stop recording HDCam
2009/05/10 07:23:46	-15.095847	-173.750474	4452	6	1	1277	White mound on screen.
2009/05/10 07:24:27	-15.095815	-173.750498	4453	6	1	1276	Slides and slumps in sediments. Possible headwalls forming.
2009/05/10 07:24:40	-15.095803	-173.750513	4455	8	2	1276	VIDEO Start recording HDCam
2009/05/10 07:25:58	-15.095721	-173.750526	4457	4	3	1276	Cowen suggests sediment could be plume deposit.
2009/05/10 07:26:27	-15.095675	-173.750525	4458	9	3	1277	Mat is turning patchy. Another pit sited ahead.
2009/05/10 07:27:04	-15.095658	-173.750484	4460	73	2	1277	Large slide making a pit possible old vent.
2009/05/10 07:27:23	-15.095652	-173.750469	4461	74	2	1277	Smokey stuff seen in base of the vent.
2009/05/10 07:27:54	-15.095651	-173.750463	4464	74	2	1277	This is a vent with **diffuse flow**.
2009/05/10 07:28:14	-15.095651	-173.750458	4465	74	2	1277	Pit is about 1 to 1.5 meters deep.
2009/05/10 07:28:54	-15.095651	-173.750448	4467	74	2	1277	Focusing on diffuse flow. Ambient temp=4.0
2009/05/10 07:29:14	-15.095652	-173.750444	4468	74	2	1277	Yellow and white mat in pit.
2009/05/10 07:29:51	-15.095653	-173.750439	4470	74	2	1277	Discussing the possibility of fluid sampling.
2009/05/10 07:30:34	-15.095643	-173.750431	4472	87	1	1278	This is **an impressive deep narrow pit**. Vent was later named **Luo** (hole or pit in Tongan)
2009/05/10 07:32:06	-15.095639	-173.750444	4474	86	1	1278	VIDEO Stop recording HDCam
2009/05/10 07:32:34	-15.095638	-173.750450	4476	86	1	1278	Testing to possibility of HFS sampling.
2009/05/10 07:34:17	-15.095641	-173.750462	4478	87	1	1278	Black sediment around the rim of the pit was likely sourced from the pit.
2009/05/10 07:34:54	-15.095641	-173.750463	4480	89	2	1278	VIDEO Start recording HDCam
2009/05/10 07:35:19	-15.095626	-173.750450	4481	134	2	1276	Possible lava seen on top of pit.
2009/05/10 07:36:21	-15.095626	-173.750413	4483	143	1	1277	Biology -- non-vent fish.
2009/05/10 07:37:25	-15.095647	-173.750406	4485	103	1	1278	Looking for a spot to HFS sample. Trying to land on a small ledge. Biology -- shrimp.
2009/05/10 07:37:46	-15.095648	-173.750403	4487	103	1	1278	Biology -- shrimp about 20.
2009/05/10 07:38:17	-15.095649	-173.750399	4488	103	1	1278	Adjusting HD cam.
2009/05/10 07:38:56	-15.095651	-173.750397	4490	103	1	1278	Starting HFS sampling.
2009/05/10 07:39:22	-15.095651	-173.750396	4491	103	1	1278	VIDEO Stop recording HDCam
2009/05/10 07:39:42	-15.095652	-173.750396	4493	103	1	1278	Taking out fluid sampler probe with port arm.
2009/05/10 07:43:19	-15.095645	-173.750447	4498	102	2	1277	Dropped fluid sampler probe.
2009/05/10 07:43:41	-15.095647	-173.750449	4500	101	1	1279	Readjusting Jason to recover probe.
2009/05/10 07:44:51	-15.095646	-173.750448	4502	102	1	1279	Recovered fluid sampler intake.
2009/05/10 07:45:40	-15.095647	-173.750438	4504	102	2	1278	Returning Jason to ledge in pit for sampling.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 07:46:54	-15.095648	-173.750393	4506	102	1	1278	Repositioning Jason. Slight temp anomaly Temp= 4.5 Biology -- zoarcid.
2009/05/10 07:47:33	-15.095648	-173.750400	4508	102	1	1278	Stirring up shrimp and red mat and white mat temp anomaly T=up to 7.
2009/05/10 07:47:59	-15.095648	-173.750400	4509	101	1	1278	Waiting for sediments to settle before sampling. Temp=8
2009/05/10 07:48:22	-15.095647	-173.750401	4510	101	1	1278	Temp=12 C and rising.
2009/05/10 07:48:35	-15.095646	-173.750402	4512	101	1	1278	VIDEO Stop recording HDCam
2009/05/10 07:49:02	-15.095645	-173.750403	4513	101	1	1278	HFS software crashed. Temp=13
2009/05/10 07:49:41	-15.095643	-173.750406	4515	101	1	1278	HFS software restarted.
2009/05/10 07:50:20	-15.095641	-173.750409	4516	102	1	1278	Moving probe closer to source looking for higher temps.
2009/05/10 07:50:39	-15.095640	-173.750411	4518	102	1	1278	Temp=16.
2009/05/10 07:51:07	-15.095639	-173.750412	4519	102	1	1278	Temp=17.
2009/05/10 07:53:41	-15.095642	-173.750408	4523	102	1	1278	Ambient Temp=6.2
2009/05/10 07:54:20	-15.095643	-173.750406	4524	102	1	1278	Moving probe lower into pit. Tmax=18.5 with pH=5.2
2009/05/10 07:55:36	-15.095645	-173.750405	4527	102	1	1278	Temp is rising with probe in this locale. Temp=19 Waiting for pH to settle out then start sampling.
2009/05/10 07:59:07	-15.095646	-173.750414	4531	102	1	1278	SAMPLE Fluid **J417-HFS-05** Sample of diffuse flow from a large pit found among a large sediment field. Lat 15 5.738'S Long 173 45.025'W. Depth=1277m **(Luo)**
2009/05/10 08:01:01	-15.095647	-173.750415	4534	102	1	1278	J417-HFS-05 cont. Unfiltered bag #21. Vent is named Luo vent. **"Luo" is Tongan for hole**.
2009/05/10 08:02:42	-15.095645	-173.750419	4536	102	1	1278	J417-HFS-05 cont. Stop Tmax=22.4 Tavg 22.5 Vol=550ml
2009/05/10 08:04:49	-15.095643	-173.750421	4537	102	1	1278	SAMPLE Fluid **J417-HFS-06**. Sterivex filter#15 Started at 08:03:19. Depth=1278m. **(Luo)**
2009/05/10 08:07:08	-15.095651	-173.750418	4538	102	1	1278	J417-HFS-06 cont. Lat 15 5.738'S Long 173 45.025'W (from LBL). This is going to take awhile.
2009/05/10 08:10:55	-15.095645	-173.750415	4539	102	1	1278	J417-HFS-06 cont. Sample of diffuse flow from deep pit found among a large sediment field.
2009/05/10 08:19:11	-15.095649	-173.750418	4540	102	1	1278	J417-HFS-06 cont. Sample for Huber. Stop 08:18:47 Tmax=22 Tavg=20 Vol 3000ml.
2009/05/10 08:22:09	-15.095645	-173.750412	4541	102	1	1278	SAMPLE Fluid **J417-HFS-07** Filtered Piston#5. Start 08:20:26 Depth=1278m Alt= 0.8 For Butterfield. Lat 15 5.738'S Long 173 45.024'W. **(Luo)**
2009/05/10 08:23:07	-15.095639	-173.750411	4542	102	1	1278	J417-HFS-07 cont. Sample of diffuse flow from large pit found a among a large sediment field.
2009/05/10 08:23:47	-15.095635	-173.750412	4543	102	1	1278	J417-HFS-07 cont. Stop 08:23:27 Tmax=21.1 Tavg = 19 Vol = 500ml
2009/05/10 08:26:36	-15.095635	-173.750423	4544	102	1	1278	SAMPLE Fluid **J417-HFS-08** GFF filter#20. For Cowen. Luo Vent. Start 08:15:05 Depth=1278m. Lat 15 5.737'S Long 173 45.025'W. **(Luo)**
2009/05/10 08:27:54	-15.095641	-173.750424	4545	102	1	1278	J417-HFS-08 cont. Sample of diffuse flow from a deep pit found among a large sediment field. POC sample for Cowen.
2009/05/10 08:28:49	-15.095645	-173.750421	4546	102	1	1278	J417-HFS-08 cont. This is going to be a large volume sample around 5 L.
2009/05/10 08:37:27	-15.095645	-173.750420	4556	102	1	1278	J417-HFS-08 cont. Shrimp are fighting on the HD cam.
2009/05/10 08:37:57	-15.095645	-173.750418	4557	102	1	1278	VIDEO Start recording HDCam J417-HFS-08 cont.
2009/05/10 08:38:23	-15.095644	-173.750418	4558	102	1	1278	J417-HFS-08 One shrimp is preying on another.
2009/05/10 08:44:24	-15.095643	-173.750419	4566	102	1	1278	J417-HFS-08 cont Biology -- fish in HD cam thermarsces.
2009/05/10 08:47:44	-15.095635	-173.750426	4570	102	1	1278	J417-HFS-08 cont. Lots of shimmering water coming out of this huge crack on the ridge crest.
2009/05/10 08:49:36	-15.095637	-173.750417	4573	102	1	1278	J417-HFS-08 cont. Still filtering water here at Luo which means pit or hole in the ground in Tongan.
2009/05/10 08:50:24	-15.095640	-173.750412	4575	102	1	1278	VIDEO Stop recording HDCam
2009/05/10 08:54:55	-15.095644	-173.750414	4580	102	1	1278	One of the shrimp ate the other. The big shrimp is a predator. Not sure which type it is. Probably chorocarris says Tim Shank.
2009/05/10 09:01:14	-15.095639	-173.750404	4587	102	1	1278	Still sitting here at Luo.
2009/05/10 09:04:12	-15.095643	-173.750419	4591	102	1	1278	J417-HFS-08 cont. GFF filter #20 stop 09:02:45. Tmax=22.7 Tavg=20.8 Vol=5000ml. Depth=1279m
2009/05/10 09:06:27	-15.095643	-173.750415	4595	102	1	1278	HFS samples 5 thru 8 have been in the same orifice at Luo - a large crack on the summit ridge. pH~5.1 (it was 5.0 at the start).
2009/05/10 09:11:20	-15.095644	-173.750410	4600	102	1	1278	Stowing the probe. Position at Luo: Lat 15 5.7385'S Long 173 45.0251'W. Depth=1279m. That is the center of the nav cluster here where we have been sitting for a couple hours.
2009/05/10 09:11:40	-15.095643	-173.750410	4602	102	1	1278	Still stowing the probe.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 09:14:06	-15.095649	-173.750453	4605	97	1	1278	Bob wants an orientation of the fracture that the venting is coming out of. Backing off to get a good look at it.
2009/05/10 09:14:43	-15.095652	-173.750461	4607	90	1	1278	Fracture looks like it is about 90 degrees. It's an east facing crack.
2009/05/10 09:14:54	-15.095655	-173.750461	4608	88	1	1278	VIDEO Start recording HDCam when we zoomed out.
2009/05/10 09:16:14	-15.095657	-173.750455	4610	55	2	1277	The heading for the crack is about 77 degrees - so it is actually sub-parallel to the ridge.
2009/05/10 09:16:51	-15.095659	-173.750436	4612	55	2	1277	We're driving right along it now.
2009/05/10 09:17:30	-15.095661	-173.750439	4614	86	2	1277	The crack is only about a half a meter wide.
2009/05/10 09:18:28	-15.095665	-173.750423	4616	85	2	1277	We're now heading to Red Rock Ridge.
2009/05/10 09:18:42	-15.095665	-173.750422	4617	85	2	1277	Will Sellers is in the pilot seat now.
2009/05/10 09:20:22	-15.095659	-173.750421	4619	68	2	1277	VIDEO Stop recording HDCam
2009/05/10 09:21:28	-15.095626	-173.750353	4622	65	4	1274	VIDEO Start recording HDCam
2009/05/10 09:22:32	-15.095607	-173.750289	4624	65	4	1269	The mat is just thick here. Not sure that's mat. We're debating whether or not it's mat.
2009/05/10 09:23:31	-15.095583	-173.750191	4626	66	3	1264	This is a distinct zone (?). The white mat is decreasing - but there are lots of large patches.
2009/05/10 09:25:09	-15.095583	-173.750088	4628	66	4	1259	Will is going to pan as we go along.
2009/05/10 09:25:44	-15.095535	-173.750091	4630	66	3	1257	White mat on intact lavas within the pillow-breccia.
2009/05/10 09:26:17	-15.095516	-173.750055	4631	68	4	1253	Patches of black on the pillows - probably volcaniclastic seds.
2009/05/10 09:26:34	-15.095527	-173.750033	4633	68	6	1252	**We're on top of the ridge rift zone.**
2009/05/10 09:27:25	-15.095553	-173.749943	4635	67	4	1252	Lots more acerage of white mat. Looks like there is warm water around here. Lots of floc in the water.
2009/05/10 09:28:05	-15.095543	-173.749941	4636	69	5	1250	Orange rocks and extensive white mats.
2009/05/10 09:28:30	-15.095505	-173.749957	4638	71	3	1249	We're going to grab a rock here.
2009/05/10 09:30:52	-15.095471	-173.749899	4641	77	7	1237	There's a great looking white fish here. An eel pout - Zoarcid - fish. That is a vent fish.
2009/05/10 09:31:33	-15.095443	-173.749809	4643	74	3	1236	It's a snow storm here. Lots of stuff raining down through the water column.
2009/05/10 09:32:13	-15.095409	-173.749710	4644	82	12	1230	Huge outcrop of pillows. Several zoarcid fish.
2009/05/10 09:32:41	-15.095394	-173.749646	4646	85	5	1226	Lots of polychaetes in the water column.
2009/05/10 09:33:10	-15.095383	-173.749619	4647	87	3	1227	We're going to look at the rocks on the top of this large outcrop.
2009/05/10 09:33:32	-15.095369	-173.749596	4649	88	7	1227	VIDEO Stop recording HDCam
2009/05/10 09:36:17	-15.095192	-173.749403	4652	98	5	1225	Knife-like ridge and zoarcid fish.
2009/05/10 09:36:48	-15.095189	-173.749398	4654	98	4	1225	The white balls on the seafloor look like sulfur balls.
2009/05/10 09:37:50	-15.095192	-173.749400	4656	101	4	1225	Zoarcid here. Hiding from us in a crack in the rocks. They eat shrimp crabs and other zoarcids.
2009/05/10 09:38:52	-15.095201	-173.749380	4658	102	4	1223	The crest of this ridge has a narrow pillow mound at the top with sands falling off on either side. Sometimes just a single ridge.
2009/05/10 09:39:16	-15.095200	-173.749379	4659	70	3	1222	Pillows draping right over the edge.
2009/05/10 09:40:18	-15.095161	-173.749317	4661	51	4	1220	VIDEO Start recording HDCam This ridge would be barely enough for someone to walk along.
2009/05/10 09:40:36	-15.095132	-173.749300	4663	47	4	1220	Those pillows just formed in place.
2009/05/10 09:41:08	-15.095093	-173.749284	4664	47	5	1216	What's the yellow we're seeing?
2009/05/10 09:41:57	-15.095029	-173.749271	4666	46	4	1213	There are very few pillows on either side. It must be very viscous or totally degassed.
2009/05/10 09:43:21	-15.094932	-173.749207	4668	49	3	1206	Landslide when we got close to the bottom.
2009/05/10 09:44:18	-15.094913	-173.749204	4670	52	3	1207	Pillows here that are broken at the edge of the ridge. Going to sample the pillow rind.
2009/05/10 09:44:38	-15.094911	-173.749206	4672	52	3	1207	VIDEO Stop recording HDCam
2009/05/10 09:46:46	-15.094926	-173.749211	4675	50	4	1206	SAMPLE Geology 9. **J417-rock-09**. Pillow rind. Small piece. Drained out pillow has orange staining on 3 of 2 sides and glassy on 1. About 7 cm long. **SW of Hades on ridge crest.**
2009/05/10 09:48:46	-15.094924	-173.749195	4678	49	4	1205	J417-rock-09 cont. Lat 15 5.696'S Long 173 44.951'W. Depth=1208m
2009/05/10 09:49:05	-15.094914	-173.749184	4679	49	4	1204	Starting the ship again. Continuing on to Red Rock Ridge.
2009/05/10 09:50:53	-15.094858	-173.749074	4682	61	3	1198	We've been near here on our first traverse. Quite the plume in Medea.
2009/05/10 09:51:19	-15.094853	-173.749020	4683	61	2	1198	Orange staining on the pillows here. Lots of volcaniclastic seds on top.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 09:52:38	-15.094828	-173.748906	4686	61	4	1192	We're overlapping with our first site.
2009/05/10 09:54:17	-15.094791	-173.748756	4688	62	2	1187	Still moving. The plume is quite thick here.
2009/05/10 09:56:16	-15.094772	-173.748692	4690	63	2	1188	Visibility is quite poor.
2009/05/10 09:57:26	-15.094730	-173.748581	4693	63	3	1189	Traveling up ridge
2009/05/10 09:58:03	-15.094734	-173.748573	4694	63	3	1190	Gauge check
2009/05/10 09:59:52	-15.094809	-173.748557	4697	33	10	1190	The plume is really thick here. Having a hard time finding the site.
2009/05/10 10:02:46	-15.094585	-173.748638	4701	96	3	1186	Climbing up again. We're in thick plumage here.
2009/05/10 10:04:47	-15.094501	-173.748599	4704	141	4	1186	Lots of shimmering water and plumage. We're down slope a bit from Rick's sample.
2009/05/10 10:04:54	-15.094499	-173.748599	4705	141	5	1186	Beautiful mats here.
2009/05/10 10:05:06	-15.094496	-173.748597	4706	141	4	1186	VIDEO Start recording HDCam
2009/05/10 10:05:45	-15.094492	-173.748592	4708	141	5	1186	We will poke around here and check out the temp etc before sampling.
2009/05/10 10:06:35	-15.094499	-173.748589	4710	141	5	1186	Sitting here getting ready for sampling we have a Tamb=6 degrees. This whole area is leaking heat.
2009/05/10 10:07:33	-15.094516	-173.748592	4712	141	5	1186	We're a bit NW of Red Rock and a bit deeper. We're at 1187m here and Red Rock Ridge (Mkr-154) is at 1180m.
2009/05/10 10:08:56	-15.094532	-173.748598	4714	141	5	1186	Heavy-duty flow. The mat is just flapping in the flow.
2009/05/10 10:09:41	-15.094535	-173.748599	4716	141	5	1186	VIDEO Stop recording HDCam
2009/05/10 10:11:13	-15.094526	-173.748588	4718	158	5	1186	VIDEO Start recording HDCam
2009/05/10 10:11:55	-15.094529	-173.748580	4720	161	4	1186	No way to suction this mat and it's killing Rick Davis.
2009/05/10 10:12:16	-15.094528	-173.748580	4721	161	4	1186	VIDEO Stop recording HDCam
2009/05/10 10:15:18	-15.094526	-173.748584	4725	160	4	1186	Jason 2 Red Rock Ridge - 7 meters bearing 201.
2009/05/10 10:15:42	-15.094525	-173.748583	4727	161	4	1186	Temp=13C and climbing a bit.
2009/05/10 10:16:39	-15.094524	-173.748580	4729	161	4	1186	Probably **epsilons (sulfur oxidizing epsilon proteobacteria)** - that's what Rick says they appear to be.
2009/05/10 10:18:57	-15.094526	-173.748579	4732	161	4	1186	The temp is actually flat lining around 15C here. The probe is right beneath the mat in a crack.
2009/05/10 10:21:13	-15.094527	-173.748589	4735	161	4	1186	Trying to decide where to sample here.
2009/05/10 10:23:08	-15.094528	-173.748582	4738	161	4	1186	Going to reposition here. Can't see the actual venting. Moving around a bit. Not right in the mat.
2009/05/10 10:25:05	-15.094534	-173.748579	4741	161	4	1186	HFS Temps are around 18C here. T2 is not going up. Worried that there may be an extra wrap in the cable.
2009/05/10 10:29:25	-15.094523	-173.748576	4747	161	4	1186	SAMPLE Fluid 10. **J417-HFS-10**. Unfiltered bag #22. Start 10:27:44. Not working. Shaking the nozzle a bit. **(Epsilon)**
2009/05/10 10:29:48	-15.094522	-173.748574	4748	161	4	1186	Reversing the pump to see if that helps. Watching the end.
2009/05/10 10:31:13	-15.094523	-173.748572	4750	161	4	1186	This site of beautiful flowing mat (that Rick hasn't been able to sample) is Lat 15 5.672'S Long 173 44.913'W Depth=1187m
2009/05/10 10:31:30	-15.094524	-173.748573	4752	161	4	1186	T2 is still not working.
2009/05/10 10:33:20	-15.094526	-173.748581	4754	161	4	1186	SAMPLE Fluid 10 cont. J417-HFS-10 cont. T2 is all of a sudden working again. Knocking a bunch of stuff off the rock.
2009/05/10 10:37:12	-15.094527	-173.748581	4759	161	4	1186	J417-HFS-10 cont. Lat 15 5.671'S Long 173 44.915'W Depth=1187m. We've dubbed this place Epsilon.
2009/05/10 10:38:04	-15.094529	-173.748581	4761	161	4	1186	J417-HFS-10 cont. Unfiltered bag #22. Julie is trying it again hoping not to waste the last sample. That sample did not work. Closing it.
2009/05/10 10:42:14	-15.094520	-173.748589	4766	161	4	1186	SAMPLE Fluid 11. **J417-HFS-11**. Unfiltered bag #23. The exhaust is not working. Stopping 10:41. Tmax=30.6 Tavg=29.6 Vol=500ml. **(Epsilon)**
2009/05/10 10:44:17	-15.094514	-173.748584	4769	161	4	1186	We're just going to wait here until Dave gets here. T2 is working (that's the temp at the back). Maybe it's fine? Julie is not sure.
2009/05/10 10:45:34	-15.094517	-173.748582	4772	161	4	1186	VIDEO Start recording HDCam here at "Epsilon".
2009/05/10 10:45:40	-15.094518	-173.748582	4773	161	4	1186	VIDEO Stop recording HDCam
2009/05/10 10:47:06	-15.094524	-173.748585	4775	161	4	1186	Dave is on the way.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 10:49:06	-15.094527	-173.748588	4778	161	4	1186	J417-HFS-10 cont. Bag #22. She's trying to fill up the bag that she did earlier. Stopped it again. No idea how much is in it.
2009/05/10 10:52:02	-15.094533	-173.748588	4782	161	4	1186	SAMPLE Fluid 12. **J417-HFS-12**. Filtered bag #19. Start 10:50:00. It's working now. Z=1187m. **(Epsilon)**
2009/05/10 10:54:30	-15.094528	-173.748585	4786	161	4	1186	J417-HFS-12 cont. Tmax=33.1 Tavg=31.8 Vol=500ml
2009/05/10 10:55:42	-15.094516	-173.748588	4788	161	4	1186	SAMPLE Fluid 13. **J417-HFS-13**. Sterivex filter #14. Start 10:54. **(Epsilon)**
2009/05/10 10:56:37	-15.094508	-173.748591	4790	161	4	1186	The HFS computer clock says 0355 AM instead of 1055 UTC. This is Kevin's computer and they didn't reset the time on it.
2009/05/10 10:58:19	-15.094508	-173.748594	4792	161	4	1186	J417-HFS-13 cont. The temp went down about 7 degrees.
2009/05/10 11:07:51	-15.094530	-173.748584	4803	161	4	1186	J417-HFS-13 cont. Still pumping here at Epsilon. Low pH here.
2009/05/10 11:11:33	-15.094529	-173.748587	4808	161	4	1186	J417-HFS-13 cont. Stop 11:10:45 Tmax=30.5 Tavg=26.2 Vol=3 liters. Epsilon.
2009/05/10 11:12:53	-15.094529	-173.748587	4810	161	4	1186	Tried filtered bag #23 again to see if she could fill it up now - but it's still not working.
2009/05/10 11:14:32	-15.094531	-173.748582	4813	160	4	1186	Going to take the nozzle out and try to flush it out and make sure it behaves like it should.
2009/05/10 11:15:56	-15.094514	-173.748583	4815	159	5	1185	Finishing up here at Epsilon.
2009/05/10 11:17:56	-15.094499	-173.748582	4818	167	5	1185	NAV Doppler reset
2009/05/10 11:19:37	-15.094628	-173.748640	4821	181	2	1185	We're heading out for Red Rock Ridge now.
2009/05/10 11:22:58	-15.094776	-173.748545	4825	21	9	1185	Looking around a bit for venting.
2009/05/10 11:23:37	-15.094705	-173.748471	4827	37	4	1181	Moving up slope.
2009/05/10 11:23:58	-15.094686	-173.748466	4828	353	4	1181	On the plus side with this sampler - All the pumps seem to be working like they should.
2009/05/10 11:25:28	-15.094604	-173.748475	4831	40	3	1177	Searching around for the Red Rock Ridge spot.
2009/05/10 11:26:57	-15.094446	-173.748457	4833	118	7	1182	All the pumps seem to be working normally now. The flush pump seems to be working. Dave is perplexed about the sampling problems he has had.
2009/05/10 11:29:28	-15.094615	-173.748681	4837	151	7	1184	Still searching around for Red Rock Ridge.
2009/05/10 11:31:53	-15.094645	-173.748595	4840	124	2	1181	We are going back where we just were.
2009/05/10 11:32:08	-15.094645	-173.748576	4841	137	3	1180	There's a bit of smoke coming out of the ground.
2009/05/10 11:33:25	-15.094522	-173.748492	4844	90	8	1177	We're approaching this bunch of red rocks here. There's a weight laying on the seafloor here.
2009/05/10 11:34:03	-15.094462	-173.748487	4845	90	10	1177	The place we sampled should have a pretty good scar on it.
2009/05/10 11:34:11	-15.094447	-173.748486	4846	91	8	1177	Shrimp on the rocks.
2009/05/10 11:34:32	-15.094409	-173.748462	4848	108	5	1177	We see lots of shrimp on this ridge here.
2009/05/10 11:35:12	-15.094351	-173.748418	4849	107	5	1176	Searching around here for a place that is clear of mat (the place we sampled with the suction sampler a few dives ago).
2009/05/10 11:37:33	-15.094387	-173.748448	4853	8	5	1175	Looking at a bunch of shrimp here.
2009/05/10 11:38:05	-15.094398	-173.748458	4854	8	7	1173	We've stirred up a bit of stuff.
2009/05/10 11:43:29	-15.094416	-173.748520	4861	14	6	1183	Can't find the marker. Won't take a sample without it.
2009/05/10 11:43:48	-15.094407	-173.748520	4862	55	8	1183	Heading to Prometheus next. No fluid sample for Rick to go with his mat.
2009/05/10 11:45:16	-15.094402	-173.748504	4864	73	8	1183	Lots more smoke than we remember last time.
2009/05/10 11:47:24	-15.094433	-173.748425	4867	91	6	1170	Seeing diffuse flow
2009/05/10 11:48:28	-15.094458	-173.748385	4870	89	2	1165	Surveying top of Ridge with diffuse
2009/05/10 11:48:42	-15.094454	-173.748383	4871	47	3	1164	Having DVCam problems...
2009/05/10 11:49:18	-15.094442	-173.748302	4872	58	2	1162	Very cloudy water
2009/05/10 11:51:04	-15.094319	-173.748204	4875	56	13	1163	DVCam label put on incorrectly- problem fixed
2009/05/10 11:51:32	-15.094255	-173.748232	4877	133	23	1163	At Prometheus- can see the vent on the seafloor- we are at 20m altitude
2009/05/10 11:54:06	-15.094112	-173.748308	4879	115	15	1184	We're coming down in the smoke.
2009/05/10 11:54:59	-15.094186	-173.748273	4881	145	4	1185	Seafloor in sight again.
2009/05/10 11:55:19	-15.094201	-173.748266	4882	144	6	1182	The navigation is not very good. Can't find Prometheus.
2009/05/10 11:55:52	-15.094231	-173.748253	4884	147	6	1180	VIDEO Start recording HDCam

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 11:56:10	-15.094244	-173.748239	4885	143	7	1178	Glassy lavas.
2009/05/10 11:56:23	-15.094250	-173.748220	4886	146	6	1178	The vent is probably a little to the left.
2009/05/10 11:56:43	-15.094250	-173.748196	4888	146	4	1178	The plume is hard to track.
2009/05/10 11:58:33	-15.094163	-173.748015	4891	113	12	1174	Searching for Prometheus.
2009/05/10 12:01:00	-15.094140	-173.747992	4894	110	12	1173	Stopped recording HD cam
2009/05/10 12:02:01	-15.094107	-173.747948	4896	124	9	1173	Medea is seeing plume. May be close to vent
2009/05/10 12:05:38	-15.094273	-173.748117	4901	175	6	1172	Found **Prometheus**.
2009/05/10 12:06:06	-15.094274	-173.748126	4902	173	5	1172	Flashing around lava plug in center of plume.
2009/05/10 12:06:26	-15.094276	-173.748130	4904	173	4	1173	Still erupting quite actively. Tephra falling out of plume
2009/05/10 12:06:44	-15.094278	-173.748135	4905	174	4	1173	Consistently flaming.
2009/05/10 12:06:57	-15.094279	-173.748138	4906	174	4	1173	HFS probe in hand.
2009/05/10 12:07:51	-15.094290	-173.748137	4908	174	3	1174	Rubble and smoke falling into a hole just in front of vent
2009/05/10 12:07:56	-15.094291	-173.748138	4909	174	3	1174	Jason heading is 175
2009/05/10 12:08:37	-15.094301	-173.748141	4911	174	3	1174	Dave wants to sample just above really hot stuff in plume above hole in front of vent.
2009/05/10 12:10:42	-15.094357	-173.748134	4915	175	3	1174	Dave is concerned that if tip hits bottom it will clog. Wants to start higher in plume to avoid solid stuff.
2009/05/10 12:11:20	-15.094380	-173.748136	4916	176	3	1174	Lots of tephra raining out of plume.
2009/05/10 12:12:20	-15.094401	-173.748144	4918	175	3	1173	Temperature is rising
2009/05/10 12:12:57	-15.094398	-173.748143	4920	175	3	1173	Camera screens are bright yellow from plume
2009/05/10 12:13:26	-15.094386	-173.748146	4922	176	3	1174	Temp is up to 60 deg on T1 of Fluid Sampler
2009/05/10 12:14:53	-15.094285	-173.748156	4924	173	7	1170	Zero visibility. Need to back out.
2009/05/10 12:15:38	-15.094185	-173.748160	4926	167	21	1167	Could not hold position.
2009/05/10 12:15:50	-15.094170	-173.748162	4927	172	22	1167	VIDEO Start recording HDCam
2009/05/10 12:15:56	-15.094162	-173.748163	4928	173	24	1167	VIDEO Stop recording HDCam
2009/05/10 12:16:10	-15.094144	-173.748161	4929	170	25	1168	HD cam stopped
2009/05/10 12:16:56	-15.094069	-173.748156	4931	175	16	1182	Jason is 20m above bottom. Jason temp=5.0
2009/05/10 12:17:25	-15.094050	-173.748141	4932	178	5	1192	Going down again
2009/05/10 12:17:47	-15.094047	-173.748131	4934	175	5	1191	Tephra is raining down onto basket
2009/05/10 12:19:17	-15.094095	-173.748153	4936	178	10	1183	Looking for vent again
2009/05/10 12:21:09	-15.094214	-173.748172	4939	180	6	1182	Vent is at about 1173m. Jason currently at 1183m and plume is thick.
2009/05/10 12:21:14	-15.094217	-173.748170	4940	180	6	1182	Visibility is zero
2009/05/10 12:22:20	-15.094259	-173.748186	4942	180	10	1177	Will turn HD back on as soon as vent is spotted.
2009/05/10 12:22:41	-15.094271	-173.748197	4944	180	12	1176	Using sonar to find plume again
2009/05/10 12:23:20	-15.094306	-173.748213	4945	180	11	1176	Maintaining heading of 180. Same as last approach
2009/05/10 12:26:30	-15.094400	-173.748236	4950	180	3	1175	pH of background waters=1.67 In murky water near vent but cannot see vent right now.
2009/05/10 12:26:46	-15.094399	-173.748258	4951	220	3	1175	Tephra is flying past Jason cameras.
2009/05/10 12:26:54	-15.094397	-173.748267	4952	221	4	1175	Looking for vent
2009/05/10 12:27:15	-15.094382	-173.748301	4953	221	8	1175	Plume is getting more intense
2009/05/10 12:28:42	-15.094381	-173.748376	4956	221	5	1175	Sulfide sensor has reading of 0.3v
2009/05/10 12:29:05	-15.094360	-173.748387	4957	186	16	1175	That is the highest reading Dave has seen. Background values are 0.08v.
2009/05/10 12:29:32	-15.094357	-173.748391	4959	184	16	1175	Bringing Medea a little closer
2009/05/10 12:31:07	-15.094353	-173.748400	4961	184	16	1175	Taking a background sample.
2009/05/10 12:32:21	-15.094360	-173.748389	4963	184	15	1175	SAMPLE Fluid 14. **J417-HFS-14**. Filtered bag#16. Starting now. (background sample **W/SW of Prometheus - we were lost in the smoke while cleaning the basket**)
2009/05/10 12:33:25	-15.094387	-173.748353	4965	205	9	1175	J417-HFS-14 cont. Water is murky. Confirm it is working by looking at exhaust. Jason is in the plume but cannot see vent.
2009/05/10 12:34:47	-15.094396	-173.748248	4968	182	1	1175	J417-HFS-14 cont. Near Prometheus vent. PI Butterfield.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 12:35:29	-15.094367	-173.748207	4970	179	7	1175	J417-HFS-14 cont. Stopped.
2009/05/10 12:35:55	-15.094355	-173.748163	4971	179	2	1175	J417-HFS-14 cont. Tmax=3.7 Tavg=3.6 Vol=454ml.
2009/05/10 12:36:18	-15.094357	-173.748150	4972	184	1	1175	Getting Medea in place.
2009/05/10 12:36:40	-15.094350	-173.748150	4974	193	1	1175	Lots of black sand being disrupted by Jason as it maneuvers near seafloor.
2009/05/10 12:38:08	-15.094320	-173.748161	4976	180	4	1174	Visibility is very low.
2009/05/10 12:38:20	-15.094329	-173.748158	4977	180	3	1174	Lots of tephra and other particles in water
2009/05/10 12:38:25	-15.094328	-173.748156	4978	180	3	1174	There's the vent again.
2009/05/10 12:38:48	-15.094322	-173.748148	4980	178	3	1174	Jason depth is 1175m. Heading is 180. Approaching vent
2009/05/10 12:39:12	-15.094315	-173.748146	4981	181	3	1173	Plume is vigorously billowing out of vent
2009/05/10 12:39:27	-15.094315	-173.748146	4983	0	0	1174	**Tephra raining onto Jason**
2009/05/10 12:40:43	-15.094315	-173.748146	4985	0	0	1174	Placing Fluid sampler wand into plume.
2009/05/10 12:42:37	-15.094315	-173.748146	4988	0	0	1173	**J417-HFS-15**. Jason is locked in place at rim of vent. Depth=1174m. Jason temp=4.7 **(Prometheus)**
2009/05/10 12:44:08	-15.094315	-173.748146	4990	0	0	1174	J417-HFS-15 cont. This is Prometheus vent. Larger pieces of tephra tumbling around low in plume.
2009/05/10 12:44:14	-15.094315	-173.748146	4991	0	0	1174	NAV Doppler reset
2009/05/10 12:44:57	-15.094315	-173.748146	4993	0	0	1174	J417-HFS-15 cont. Pump is on. Piston#2.
2009/05/10 12:45:05	-15.094315	-173.748146	4994	0	0	1174	J417-HFS-15 cont. Temperature is going up.
2009/05/10 12:46:19	-15.094315	-173.748146	4996	0	0	1174	J417-HFS-15 cont. Wand is in and out of plume as plume moves about.
2009/05/10 12:46:52	-15.094315	-173.748146	4998	0	0	1174	J417-HFS-15 cont. Wand is positioned directly over vent but not near bottom of it.
2009/05/10 12:48:20	-15.094315	-173.748146	5000	0	0	1174	J417-HFS-15 cont. Vent looks a lot like NW Rota with tephra in plume. Starting sample now.
2009/05/10 12:48:59	-15.094315	-173.748146	5002	0	0	1174	J417-HFS-15 cont. Not seeing shimmering water coming out of exhaust.
2009/05/10 12:50:03	-15.094315	-173.748146	5004	0	0	1174	J417-HFS-15 cont. Getting flow out of exhaust.
2009/05/10 12:50:57	-15.094315	-173.748146	5006	0	0	1174	J417-HFS-15 cont. The sampler is not working very well.
2009/05/10 12:52:28	-15.094315	-173.748146	5009	0	0	1174	J417-HFS-15 cont. Stopped. Tmax=13.9 Tavg=6.2 Vol=giving error probably about 400ml
2009/05/10 12:52:59	-15.094315	-173.748146	5010	0	0	1174	Moving wand to a different place in plume.
2009/05/10 12:54:24	-15.094315	-173.748146	5012	0	0	1174	Tephra in plume has increased.
2009/05/10 12:55:10	-15.094315	-173.748146	5014	0	0	1174	SAMPLE Fluid 16. **J417-HFS-16**. Positioning wand into plume again. **(Prometheus)**
2009/05/10 12:55:35	-15.094315	-173.748146	5016	0	0	1174	J417-HFS-16 cont. Pump is on. Temp going up. Piston#3 started.
2009/05/10 12:56:10	-15.094315	-173.748146	5017	0	0	1174	VIDEO Stop recording HDCam
2009/05/10 12:56:29	-15.094315	-173.748146	5019	0	0	1174	J417-HFS-16 cont. Not seeing anything coming out of fluid sampler exhaust.
2009/05/10 12:56:44	-15.094315	-173.748146	5020	0	0	1174	J417-HFS-16 cont. Stopped.
2009/05/10 12:57:46	-15.094315	-173.748146	5022	0	0	1174	J417-HFS-16 cont. Watching exhaust for sign of anything coming out.
2009/05/10 12:59:15	-15.094315	-173.748146	5024	0	0	1174	J417-HFS-16 cont. Tmax=44.8 Tavg=16 Vol=200
2009/05/10 13:00:19	-15.094315	-173.748146	5026	0	0	1174	SAMPLE Fluid 17. **J417-HFS-17**. Piston#4 Unfiltered. **(Prometheus)**
2009/05/10 13:00:36	-15.094315	-173.748146	5028	0	0	1174	J417-HFW-17 cont. Starting now.
2009/05/10 13:01:23	-15.094315	-173.748146	5029	0	0	1174	J417-HFS-17 cont. Pilot noted vent hole is getting deeper.
2009/05/10 13:02:14	-15.094315	-173.748146	5031	0	0	1174	J417-HFS-17 cont. Cameras are blacked out from plume moving over Jason.
2009/05/10 13:04:23	-15.094315	-173.748146	5034	0	0	1174	J417-HFS-17 cont. Stopped.
2009/05/10 13:05:01	-15.094315	-173.748146	5036	0	0	1174	J417-HFS-17 cont. Tmax=60 Tavg=15.9 Vol=200
2009/05/10 13:05:55	-15.094315	-173.748146	5038	0	0	1174	Note that Pistons #2 and #3 were filtered. Piston #4 was unfiltered.
2009/05/10 13:06:48	-15.094315	-173.748146	5040	0	0	1174	SAMPLE Fluid 18. **J417-HFS-18**. Unfiltered bag #24. **(Prometheus)**
2009/05/10 13:07:23	-15.094315	-173.748146	5041	0	0	1174	J417-HFS-18 cont. Started now.
2009/05/10 13:08:07	-15.094315	-173.748146	5043	0	0	1174	J417-HFS-18 cont. Something is coming out of exhaust.
2009/05/10 13:09:15	-15.094315	-173.748146	5045	0	0	1174	J417-HFS-18 cont. Stopped.
2009/05/10 13:09:32	-15.094315	-173.748146	5047	0	0	1174	J417-HFS-18 cont. Tmax=13.4 Ave=7.2 Vol=330ml
2009/05/10 13:10:27	-15.094315	-173.748146	5049	0	0	1174	J417-HFS-18 cont. T2 got up to 8 degrees so there was warm water in the system.
2009/05/10 13:13:04	-15.094315	-173.748146	5052	0	0	1172	**Jason backing away from vent to get out of intense plume.**

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 13:14:12	-15.094315	-173.748146	5054	0	0	1173	Dave is done sampling at Prometheus vent.
2009/05/10 13:14:36	-15.094315	-173.748146	5055	0	0	1172	Time to move to Hades.
2009/05/10 13:16:09	-15.094315	-173.748146	5056	0	0	1179	**Loads of tephra on basket now.**
2009/05/10 13:18:40	-15.094315	-173.748146	5060	0	0	1186	Visibility is very low.
2009/05/10 13:19:24	-15.094315	-173.748146	5061	0	0	1185	Jason heading is 228. Moving southwest.
2009/05/10 13:21:17	-15.094315	-173.748146	5064	0	0	1193	Medea is looking down on big plume. Jason depth is 1194m now.
2009/05/10 13:22:28	-15.094365	-173.748689	5067	229	19	1189	Medea is in plume. Water clearing up a little at Jason
2009/05/10 13:23:17	-15.094405	-173.748801	5068	231	26	1186	Trying to find some clear water and will try to get rid of some of the weight from rocks that fell into basket while sitting at Prometheus.
2009/05/10 13:26:41	-15.094443	-173.748850	5073	238	18	1194	Stowing fluid sampler wand.
2009/05/10 13:29:04	-15.094438	-173.748824	5076	238	18	1194	Fluid sampler wand set on basket.
2009/05/10 13:29:54	-15.094456	-173.748830	5078	238	18	1194	Removing weight.
2009/05/10 13:30:29	-15.094471	-173.748837	5080	239	18	1194	**Removing some rocks that fell onto basket while sitting near Prometheus vent for fluid sampling.**
2009/05/10 13:33:14	-15.094498	-173.748847	5083	238	18	1194	Lots of gravel sized tephra all around basket can't get rid of.
2009/05/10 13:33:49	-15.094498	-173.748843	5085	238	18	1194	**80 lbs negative buoyancy.**
2009/05/10 13:36:09	-15.094547	-173.748877	5088	239	17	1195	Will try to find Hades and see what is happening there.
2009/05/10 13:36:44	-15.094574	-173.748923	5090	246	12	1199	***NAV Doppler reset***
2009/05/10 13:37:08	-15.094583	-173.748923	5092	245	6	1205	**Seeing plume from Hades.**
2009/05/10 13:38:07	-15.094598	-173.748951	5094	258	4	1210	Visibility is zero
2009/05/10 13:38:17	-15.094602	-173.748957	5095	256	4	1211	Jason is at 1212m depth
2009/05/10 13:41:34	-15.094688	-173.749025	5100	229	5	1212	Moving towards Hades. Still mostly in plume and visibility is poor.
2009/05/10 13:43:49	-15.094723	-173.749044	5103	205	7	1213	Dave says sampler seems to still be working. Cannot tell why sometimes exhaust seemed to not have much flow coming out of it.
2009/05/10 13:46:54	-15.094852	-173.749220	5107	223	4	1216	Jim Varnum is now our trusty pilot.
2009/05/10 13:47:42	-15.094852	-173.749220	5109	0	0	1215	Big plume behind Jason but pretty clear in front.
2009/05/10 13:47:53	-15.094852	-173.749220	5110	0	0	1215	Jason heading is 220
2009/05/10 13:52:40	-15.094852	-173.749220	5116	0	0	1215	Moving Medea to west
2009/05/10 13:57:32	-15.094852	-173.749220	5121	0	0	1215	Still maneuvering
2009/05/10 13:58:06	-15.094852	-173.749220	5122	0	0	1215	Talking about what to do with all the extra rocks in the basket.
2009/05/10 14:02:11	-15.094852	-173.749220	5127	0	0	1216	Jason is now in plume. Visibility is zero.
2009/05/10 14:02:40	-15.094852	-173.749220	5129	0	0	1215	Jason back out of plume. Medea hovering over plume.
2009/05/10 14:04:39	-15.094852	-173.749220	5132	0	0	1216	Can see seafloor again.
2009/05/10 14:05:30	-15.094852	-173.749220	5134	0	0	1214	Large lobate lavas
2009/05/10 14:10:05	-15.094852	-173.749220	5139	0	0	1214	Going to try to remove extra rocks to lighten load.
2009/05/10 14:10:40	-15.094852	-173.749220	5141	0	0	1214	Only removing rocks that rained into the basket while sitting at Prometheus.
2009/05/10 14:40:02	-15.094852	-173.749220	5171	0	0	1214	**Removing extra rocks.** Noticed the Davis Sampler that had been laid in the center of the basket was no longer there. Looked back and it looks like the sampler was lost between 11:19:37 and 11:20:25
2009/05/10 14:40:35	-15.094852	-173.749220	5173	0	0	1214	Refer to Virtual Van record numbers 4821 and 4822
2009/05/10 14:42:38	-15.094852	-173.749220	5176	0	0	1214	Still removing rocks from basket.
2009/05/10 14:42:55	-15.094852	-173.749220	5177	0	0	1214	Getting USBL fixes again
2009/05/10 14:51:31	-15.094852	-173.749220	5187	0	0	1214	Still rearranging basket and trying to remove excess weight.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 14:58:14	-15.094852	-173.749220	5194	0	0	1214	SAMPLE Fluid 19. **J417-HFS-19**. Piston#9 Filtered. Starting now. **(W/SW of Hades - we were lost in the smoke while cleaning the basket)**
2009/05/10 14:59:24	-15.094852	-173.749220	5196	0	0	1214	J417-HFS-19 cont. Background sample. Taking sample while cleaning out basket. Lat 15 5.705'S Long 173 44.963'W Depth=1214m
2009/05/10 15:01:28	-15.094852	-173.749220	5200	0	0	1214	J417-HFS-19 cont. Stopped
2009/05/10 15:01:50	-15.094852	-173.749220	5201	0	0	1214	J417-HFS-19 cont. Tmax=3.3 Tavg=3.2 Vol=550ml
2009/05/10 15:07:04	-15.094852	-173.749220	5207	0	0	1220	Have removed just about all the tephra we can. Weight is still negative at surface. Need to loose another 20 lbs.
2009/05/10 15:13:23	-15.094852	-173.749220	5214	0	0	1220	**Using suction sampler to vacuum tephra** from around sample in GeoBox#3A. The pillow fragment is too large to get sucked into suction sampler so no danger of loosing sample.
2009/05/10 15:16:26	-15.094852	-173.749220	5218	0	0	1220	Moved gastights to stbd side.
2009/05/10 15:22:14	-15.094852	-173.749220	5225	0	0	1220	Moved Davis sampler from GeoBox4b to GeoBox 3b
2009/05/10 15:27:45	-15.094852	-173.749220	5232	0	0	1220	Continuing to use suction sampler to remove tephra from basket
2009/05/10 15:30:45	-15.095278	-173.749440	5236	156	4	1216	Ship needed to change heading. Moving to keep up with Medea
2009/05/10 15:36:09	-15.095278	-173.749440	5242	0	0	1231	Still removing tephra from basket
2009/05/10 15:39:34	-15.095278	-173.749440	5247	0	0	1231	Akel just said he had turned off USBL for Jason about half an hour ago. Still have USBL for Medea
2009/05/10 15:51:05	-15.095421	-173.749207	5259	315	14	1213	Jason is moving alongside a wall with pillow tubes
2009/05/10 15:59:38	-15.095188	-173.749363	5269	316	3	1209	Weight lifted from Jason.
2009/05/10 16:01:03	-15.095188	-173.749363	5271	316	3	1209	**Around 60 pounds was cleaned from the vehicle.**
2009/05/10 16:02:43	-15.095087	-173.749430	5274	316	7	1214	Scoop 1 was moved to 3b during basket cleaning.
2009/05/10 16:04:19	-15.095086	-173.749436	5276	20	12	1213	HFS sampling summary -- four diffuse vent sites; two attempts at Prometheus. Latest attempt yielded 4 samples.
2009/05/10 16:04:47	-15.095091	-173.749407	5278	14	9	1213	Moving to Hades to attempt HFS sampling and good HD video.
2009/05/10 16:05:45	-15.095127	-173.749394	5280	23	6	1213	Smoke evident.
2009/05/10 16:10:49	-15.094737	-173.749420	5286	21	14	1214	***NAV Doppler reset [Shifted nav 40m north]***
2009/05/10 16:11:47	-15.094710	-173.749413	5288	52	18	1214	Current is coming from the SE. Approaching Hades from the SW.
2009/05/10 16:12:32	-15.094740	-173.749249	5290	99	9	1213	Driving towards Hades.
2009/05/10 16:13:14	-15.094704	-173.749194	5291	97	7	1211	Ambient temp = 4.0
2009/05/10 16:14:37	-15.094677	-173.749084	5294	80	6	1209	Long pillow.
2009/05/10 16:14:56	-15.094654	-173.749059	5295	99	5	1208	Water contains a good amount of smoke.
2009/05/10 16:15:59	-15.094641	-173.749019	5297	124	4	1205	Hades in view. Absence of active pillow formation.
2009/05/10 16:17:04	-15.094660	-173.748987	5299	87	4	1202	**Hades** is vigorously erupting.
2009/05/10 16:17:52	-15.094663	-173.748976	5301	78	3	1202	Setting Jason up to sample vent. Some red flashing evident.
2009/05/10 16:19:12	-15.094663	-173.748976	5304	80	4	1202	VIDEO Stop recording HDCam
2009/05/10 16:19:34	-15.094663	-173.748976	5306	79	4	1202	Trying to grab HFS probe.
2009/05/10 16:20:56	-15.094663	-173.748975	5308	80	4	1202	Fume and new columns observed behind the main plume.
2009/05/10 16:22:08	-15.094663	-173.748975	5310	78	4	1202	Probe placed into plume about 1/2 meter from source in exploding rock.
2009/05/10 16:23:27	-15.094663	-173.748974	5312	78	4	1202	VIDEO Start recording HDCam
2009/05/10 16:24:07	-15.094663	-173.748974	5314	78	4	1202	SAMPLE Fluid **J417-HFS-20** Piston sample # 6 Start 16:23:57 Depth=1202m Alt= 3.1. **(Hades)**
2009/05/10 16:25:33	-15.094663	-173.748974	5317	78	4	1202	J417-HFS-20 cont. Lat 15 5.68901'S Long 173 44938'W (from DP). Sample of main Hades plume for Butterfield.
2009/05/10 16:26:55	-15.094663	-173.748974	5319	78	4	1202	J417-HFS-20 cont. Plume suddenly stopped briefly during sampling. Small bursts of red evident.
2009/05/10 16:27:51	-15.094663	-173.748974	5321	78	4	1202	J417-HFS-20 cont. Stopped 16:27:20 Tmax=43.1 Tavg=19.1 Vol=410ml
2009/05/10 16:29:58	-15.094663	-173.748974	5324	78	4	1202	SAMPLE Fluid **J417-HFS-21** Started 16:29:52 Depth=1203m Alt=3.0 Lat 15 5.680'S Long 173 44.938'W (from DP). **(Hades)**

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 16:30:59	-15.094663	-173.748974	5326	78	4	1202	J417-HFS-21 cont. Unfiltered piston #8. For Butterfield. Sample of main Hades plume about 1/2 of meter from source.
2009/05/10 16:31:48	-15.094663	-173.748974	5328	78	4	1202	J417-HFS-21 cont. Vent has a small tight eruptive cycle and shuts of every 2 minutes or so.
2009/05/10 16:33:11	-15.094663	-173.748973	5330	77	4	1202	J417-HFS-21 cont. Stop 16:32:35 Tmax= 50.3 Tavg= 42.6 Vol= 491ml
2009/05/10 16:35:05	-15.094663	-173.748973	5333	77	4	1202	SAMPLE Fluid **J417-HFS-22** Filtered piston #7 Start 16:33:33. Depth=1203m Alt=3.1 Lat 15 5.680'S Long 173 44.938'W. **(Hades)**
2009/05/10 16:36:16	-15.094663	-173.748973	5335	77	4	1202	J417-HFS-22 cont. Sample of Hades plume for Butterfield. Pump is stalling. HFS probe is about 1.2 meter from source.
2009/05/10 16:36:50	-15.094663	-173.748972	5337	77	4	1202	J417-HFS-22 cont. Tephra is falling into basket.
2009/05/10 16:38:02	-15.094670	-173.748980	5339	84	4	1202	J417-HFS-22 cont. Stop 16:37:07 Tmax=49 Tavg =47 T2=16 Vol=unknown
2009/05/10 16:38:54	-15.094670	-173.748979	5341	84	4	1202	SAMPLE Gas Flames coming from Hades.
2009/05/10 16:39:14	-15.094670	-173.748978	5342	84	4	1202	Sorry NO SAMPLE
2009/05/10 16:41:15	-15.094670	-173.748978	5345	84	4	1202	SAMPLE Gas **J417-GTB-23**. Port gas tight. Depth=1202m Alt=3.8 Lat 15 5.680'S Long 173 44.939'W. T1=32 T2=12. **(Hades)**
2009/05/10 16:42:15	-15.094670	-173.748978	5347	84	4	1202	J417-gas-23 cont. Gas tight bottle of Hades plume.
2009/05/10 16:43:44	-15.094670	-173.748978	5350	84	4	1202	SAMPLE Gas Flames and red evident in plume.
2009/05/10 16:45:06	-15.094670	-173.748978	5352	84	4	1202	Sorry NO SAMPLE
2009/05/10 16:45:53	-15.094670	-173.748978	5354	84	4	1202	SAMPLE Gas **J417-GTB-24**. Starboard gastight. Depth=1202m Alt 3.8 Lat 15 5.680'S Long 173 44.939'W T1=31 T2=12
2009/05/10 16:46:24	-15.094670	-173.748978	5355	84	4	1202	J417-gas-24 cont. Gastight sample of Hades plume.
2009/05/10 16:48:09	-15.094670	-173.748978	5358	84	4	1202	**J417-HFS-25**. Unfiltered piston#1. Started 16:47:01 Depth=1202m Alt 3.4 Lat 15 5.680'S Long 173 44.939'W. **(Hades)**
2009/05/10 16:49:46	-15.094670	-173.748978	5361	84	4	1202	J417-HFS-25 cont. Fluid sample of Hades plume for Butterfield. HFS sample right in plume above red glowing vent.
2009/05/10 16:51:13	-15.094670	-173.748978	5363	84	4	1202	J417-HFS-25 cont. Stopped 16:50:12 Tmax=48.8 Tavg=40.2 Vol= 365ml T2=17
2009/05/10 16:52:07	-15.094670	-173.748978	5365	83	4	1202	Vent is stopping abruptly often for several second then starting right back up.
2009/05/10 16:53:01	-15.094670	-173.748978	5367	83	4	1202	Lots of plume smoke and tephra originating from a red fire glow.
2009/05/10 16:53:13	-15.094670	-173.748978	5368	83	4	1202	Attempting a pH reading.
2009/05/10 16:54:12	-15.094670	-173.748978	5370	83	4	1202	Vent just shut off again.
2009/05/10 16:55:25	-15.094670	-173.748979	5372	83	4	1202	Vent erupting for several minutes throwing up clouds and bigger clasts.
2009/05/10 16:56:17	-15.094670	-173.748979	5374	83	4	1202	Clasts 2-3 cm in diameters. Creating small opening and after several minutes of this vent abruptly stops.
2009/05/10 16:57:15	-15.094670	-173.748978	5376	83	4	1202	After 5 to 10 seconds of rest vent continues.
2009/05/10 16:57:25	-15.094670	-173.748978	5377	84	4	1202	Venting is intermittent.
2009/05/10 16:58:13	-15.094670	-173.748979	5379	83	4	1202	pH=1.6 Voltage on H2S sensor is down to 1-2 volts.
2009/05/10 16:59:42	-15.094670	-173.748978	5382	83	4	1202	Fluid sampling complete. HD filming.
2009/05/10 17:02:07	-15.094670	-173.748978	5385	84	4	1202	Flame from vent creating sulfur smoke and throwing rocks into the water column which fall back into vent which in turn throws them back.
2009/05/10 17:02:34	-15.094669	-173.748978	5387	84	4	1201	Moving Jason for a different angle.
2009/05/10 17:04:07	-15.094655	-173.748983	5389	84	7	1200	Heading 083. There is another vent in the background due east throwing large chunks of tephra.
2009/05/10 17:04:14	-15.094655	-173.748983	5390	84	7	1199	Big lateral blast.
2009/05/10 17:05:31	-15.094642	-173.749003	5393	103	7	1200	Far vent much larger producing lots of smoke.
2009/05/10 17:05:53	-15.094654	-173.748993	5394	103	7	1200	**Hades is a large mound with two vents.**
2009/05/10 17:06:30	-15.094667	-173.748994	5396	89	6	1200	Searching for pillows and moving Jason for good HD filming.
2009/05/10 17:08:07	-15.094655	-173.748996	5398	90	8	1200	More lateral eruptions from larger vent in background.
2009/05/10 17:08:20	-15.094655	-173.748996	5399	90	8	1200	**Vent has risen 7 meters.**
2009/05/10 17:09:07	-15.094655	-173.748996	5401	90	8	1200	Vents are cycling together.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 17:09:47	-15.094655	-173.748996	5403	90	8	1200	Back vent is creating a huge plume.
2009/05/10 17:11:06	-15.094680	-173.748977	5405	63	4	1200	Moving Jason for another view. Moving to the east heading 066.
2009/05/10 17:12:44	-15.094692	-173.748962	5408	47	5	1200	Searching for pillows. Some wispy plume originating from sediment pile.
2009/05/10 17:13:15	-15.094693	-173.748961	5409	43	5	1200	Large big chunks of rock and tephra are being thrown from the back vent.
2009/05/10 17:13:59	-15.094693	-173.748961	5411	28	4	1200	DSC pictures being taken.
2009/05/10 17:14:42	-15.094693	-173.748970	5413	38	4	1200	Heading towards the west to get a better view of the larger vent.
2009/05/10 17:17:20	-15.094608	-173.748990	5416	148	8	1200	**Different view of Hades. A large mound of debris with two main vents: a larger one with red glow and a smaller one also with some glow.**
2009/05/10 17:17:38	-15.094604	-173.748975	5418	174	6	1200	Plumes moving south to north.
2009/05/10 17:18:29	-15.094607	-173.748945	5420	194	2	1200	Good view of the larger vent.
2009/05/10 17:18:51	-15.094604	-173.748962	5421	185	5	1200	Red jetting fire at base
2009/05/10 17:20:38	-15.094633	-173.749002	5424	139	7	1200	Moving around larger vent. Vigorous venting with red jetting fire.
2009/05/10 17:21:32	-15.094632	-173.749005	5426	141	7	1200	There seems to be an absence of pillows.
2009/05/10 17:23:00	-15.094633	-173.749006	5428	141	7	1200	Heading 141. Jason is downslope of vent. Depth=1201m Alt=6.2 Lat 15 5.678'S Long 173 44.963'W Heading=141.1
2009/05/10 17:24:45	-15.094634	-173.749007	5431	141	7	1200	Large rock is forming.
2009/05/10 17:25:26	-15.094634	-173.749007	5432	141	7	1200	Observing main larger vent.
2009/05/10 17:26:37	-15.094633	-173.749015	5435	65	7	1200	Searching for a diffuse flow to sample some shrimp.
2009/05/10 17:28:22	-15.094665	-173.749047	5437	220	6	1200	Heading 242 to target week fluid flow for shrimp sampling.
2009/05/10 17:29:25	-15.094804	-173.749167	5439	219	5	1201	Moving over large wall.
2009/05/10 17:30:17	-15.094863	-173.749195	5441	122	5	1203	Pillows dusted with black sediment. Some hydrothermal staining.
2009/05/10 17:31:07	-15.094834	-173.749191	5443	102	5	1202	Searching for weak fluid flow.
2009/05/10 17:31:28	-15.094821	-173.749194	5444	123	8	1203	A younger flow on top of older pillows.
2009/05/10 17:33:01	-15.094806	-173.749149	5447	146	6	1203	Moving towards Red Rock Ridge.
2009/05/10 17:33:27	-15.094792	-173.749140	5448	109	7	1203	VIDEO Stop recording HDCam
2009/05/10 17:34:12	-15.094768	-173.749079	5450	74	9	1201	Large wall starboard.
2009/05/10 17:34:51	-15.094750	-173.749037	5452	73	10	1199	**Hades in view with some serious glowing.**
2009/05/10 17:36:09	-15.094748	-173.749052	5454	74	11	1199	Going to drive through plume and take both niskin samples.
2009/05/10 17:38:39	-15.094745	-173.749049	5458	74	12	1197	Hades in view taking DSC pictures and preparing to drive through plume.
2009/05/10 17:38:56	-15.094745	-173.749047	5459	74	16	1193	Moving into the plume.
2009/05/10 17:41:17	-15.094655	-173.748863	5462	79	18	1179	SAMPLE Fluid **J417-niskin-26**. Niskin sample in **Hades plume**. White Niskin for Resing. Depth=1179m Alt= 26.3 Lat 15 5.681'S Long 173 44.934'W
2009/05/10 17:41:47	-15.094661	-173.748795	5464	74	17	1179	SAMPLE Fluid **J417-niskin-27**. Niskin sample in **Hades plume**. Black Niskin for Resing. Depth=1179m Alt= 26.3 Lat 15 5.681'S Long 173 44.934'W
2009/05/10 17:42:24	-15.094651	-173.748795	5465	73	17	1179	Black and white niskin samples taken simultaneously.
2009/05/10 17:42:36	-15.094645	-173.748787	5467	73	17	1179	Shrimp search.
2009/05/10 17:43:18	-15.094610	-173.748673	5468	77	9	1180	**Moving downslope to Red Rock Ridge (never got there).**
2009/05/10 17:43:51	-15.094604	-173.748579	5470	74	3	1181	Alvin weight.
2009/05/10 17:44:42	-15.094615	-173.748561	5472	52	4	1180	Volcaniclastic tephra fall out coating pillows covered with yellow green material.
2009/05/10 17:45:03	-15.094633	-173.748547	5473	18	5	1180	VIDEO Start recording HDCam
2009/05/10 17:46:15	-15.094607	-173.748501	5475	348	5	1179	White wispy mat.
2009/05/10 17:47:13	-15.094574	-173.748573	5477	108	6	1177	Abandoning shrimp search and going to recover lost scoop.
2009/05/10 17:48:12	-15.094569	-173.748604	5479	131	5	1179	Bottom covered with black sediment.
2009/05/10 17:48:33	-15.094568	-173.748631	5481	125	5	1182	Moving downslope.
2009/05/10 17:49:37	-15.094610	-173.748638	5483	102	2	1186	***NAV Doppler reset***
2009/05/10 17:50:04	-15.094640	-173.748660	5484	105	4	1185	Searching for lost scoop.

timestamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J417 log comments (West Mata)
2009/05/10 17:50:39	-15.094647	-173.748689	5486	206	5	1184	Bottom covered with black sediment covered with white mat.
2009/05/10 17:51:56	-15.094681	-173.748573	5488	46	3	1184	Biology -- shrimp.
2009/05/10 17:52:27	-15.094671	-173.748542	5489	20	6	1181	Searching for shrimp.
2009/05/10 17:53:02	-15.094646	-173.748535	5491	16	5	1179	Large outcrop in view.
2009/05/10 17:54:09	-15.094566	-173.748462	5493	76	5	1175	Butterfield observed some shimmering.
2009/05/10 17:54:56	-15.094559	-173.748430	5495	115	2	1175	Sharp ridge with pillows amongst black sediment.
2009/05/10 17:56:17	-15.094591	-173.748497	5497	130	3	1177	Search over. Heading towards recovery station.
2009/05/10 17:57:12	-15.094608	-173.748470	5499	132	3	1176	JASON off bottom
2009/05/10 18:54:14	-15.094841	-173.748047	5502	137	165	2	Medea on deck.
2009/05/10 19:02:16	-15.094858	-173.748188	5503	143	164	1	Jason out of water
2009/05/10 19:03:23	-15.094861	-173.748191	5504	153	164	1	JASON on deck

J2-418 Dive Log

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 03:56:26					1	1	JASON in water
2009/05/11 03:56:57					175	3	Tools: Single chamber suction sampler. Vent fluid sampler. 4 scoop bags. 2 gastights.
2009/05/11 03:57:57					188	3	Tasks: Traverse from NE rift zone landing (1574m) upslope to summit. Sample rocks etc.
2009/05/11 03:58:23					197	3	Tasks cont: Vent fluid sampling of diffuse vents. Opportunistic sampling of biology and geology.
2009/05/11 03:58:44					182	2	Tasks cont: Deploy hydrophone near vent (S/SE of Hades).
2009/05/11 03:59:08					186	3	Medea in the water.
2009/05/11 03:59:33					192	3	Tasks cont: Time permitting - back to Hades for visual observations.
2009/05/11 04:00:20					196	5	Basket: milk crates. 2GTB; 4 markers; 4 scoop bags; HFS wand; suction hose; hydrophone.
2009/05/11 04:00:25					196	7	Going down.
2009/05/11 04:35:43					51	1077	Smoke in the water column and we are still 500m off the bottom
2009/05/11 04:36:48					71	1103	Lots of smoke still
2009/05/11 04:42:34					108	1262	Still seeing plume
2009/05/11 04:43:56	-15.094905	-173.748182	5520	129	58	1304	Plumage since 1300m altitude.
2009/05/11 04:57:51	-15.094827	-173.748273	5522	268	7	1558	JASON on bottom Seafloor in sight. Altitude 8m.
2009/05/11 05:00:07	-15.087953	-173.742373	5525	216	12	1558	On the bottom here. Resetting the high def camera.
2009/05/11 05:00:23	-15.087957	-173.742372	5526	216	12	1558	On the bottom 1800 local.
2009/05/11 05:00:44	-15.087962	-173.742370	5528	216	12	1558	Dropping a weight or two.
2009/05/11 05:01:48	-15.087979	-173.742362	5530	216	12	1558	Setting ourselves up here on the bottom at 1559 meters.
2009/05/11 05:02:39	-15.087987	-173.742353	5532	216	12	1558	AUV will be within less than 100m of us in 10 minutes.
2009/05/11 05:06:40	-15.087932	-173.742347	5537	216	10	1558	Our heading is 216 degrees.
2009/05/11 05:06:55	-15.087946	-173.742317	5538	237	7	1559	Truncated pile of flow here. Below us is a very steep scarp.
2009/05/11 05:07:54	-15.087975	-173.742329	5541	252	3	1562	The vesicular rock below is covered with volcaniclastic sediments.
2009/05/11 05:09:54	-15.088003	-173.742321	5544	251	3	1562	SAMPLE Geology 1. J418-rock-01. Joe Resing is trying to sample this rock. Yikes.
2009/05/11 05:11:43	-15.087991	-173.742307	5547	251	3	1562	J418-rock-01 cont. Tito is back in the hot seat. Yeah. Want something that is in place. We want one fresh surface.
2009/05/11 05:12:43	-15.087989	-173.742335	5549	254	2	1563	J418-rock-01 cont. Light colored flow here. Looks altered. Still setting up to sample.
2009/05/11 05:13:35	-15.087988	-173.742339	5550	256	3	1563	J418-rock-01 cont.
2009/05/11 05:14:13	-15.087990	-173.742342	5552	257	2	1563	Looking at something on the high def cam that looks very out of place. Looks like a webbing. Could be an egg sac - perhaps microbial?
2009/05/11 05:15:20	-15.087991	-173.742358	5554	208	5	1562	Coming up a bit because the whole piece is in place.
2009/05/11 05:16:53	-15.087993	-173.742355	5557	205	5	1562	**J418-rock-01** cont. Got a big rock. Tito is smashing it up. Going to try for a smaller piece. **[Landing site: N of NE Rift Zone]**
2009/05/11 05:18:35	-15.087984	-173.742351	5559	202	5	1562	J418-rock-01 cont. Still trying to sample here. Lovely looking piece of rock.
2009/05/11 05:19:46	-15.087979	-173.742348	5562	206	5	1562	J418-rock-01 cont. Altered pillow fragment. 15 cm long 8 cm wide. Vesicular. Yellow oxidation rind.
2009/05/11 05:21:02	-15.087982	-173.742347	5564	208	5	1562	J418-rock-01 cont. Lat 15 5.280'S Long 173 44.541'W
2009/05/11 05:21:20	-15.087983	-173.742347	5565	207	5	1561	This whole outcrop is embedded in sand.
2009/05/11 05:21:58	-15.087985	-173.742350	5567	207	6	1561	Sometimes the filaments are actually foraminifera - they stack on top of themselves.
2009/05/11 05:23:04	-15.087987	-173.742358	5569	207	5	1561	The surface of this rock is quite convoluted and folded over.
2009/05/11 05:23:42	-15.087976	-173.742336	5571	155	8	1561	Heading to point B. Up slope to crest of rift zone.
2009/05/11 05:26:20	-15.088012	-173.742306	5574	155	4	1562	The AUV is way too close to us. It's going 3 knots 75m off the bottom.
2009/05/11 05:26:49	-15.088029	-173.742295	5576	154	4	1560	Moving right along now.
2009/05/11 05:27:47	-15.088079	-173.742322	5578	154	5	1555	Heading up slope now. More big clasts coming down slope. Quite a bit of sediment here. It's grayer. Not fresh volcaniclastics.
2009/05/11 05:29:07	-15.088166	-173.742322	5580	154	7	1549	Debating what we are seeing. Probably in place. The flows are pointing toward us.
2009/05/11 05:30:10	-15.088195	-173.742406	5582	154	4	1548	Pillows ahead of us.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 05:30:37	-15.088212	-173.742409	5583	154	5	1546	Rounded bulbous pillows. Several flow units stacked on top of each other.
2009/05/11 05:31:05	-15.088223	-173.742413	5585	155	5	1545	There is a bit of darker volcaniclastic stuff
2009/05/11 05:31:32	-15.088226	-173.742420	5586	154	5	1545	Sediment doesn't look like the real fresh stuff we see on the rift zone. Surface doesn't look too fresh either.
2009/05/11 05:32:51	-15.088262	-173.742396	5589	155	4	1538	Looks like some of this is covered with pelagic seds. Slides occur and uncover the blacker seds underneath.
2009/05/11 05:33:23	-15.088268	-173.742383	5590	154	5	1537	Ripple marks on these seds.
2009/05/11 05:34:21	-15.088309	-173.742363	5592	154	4	1534	Big outcrop up ahead. It's a headwall exposing some older lavas.
2009/05/11 05:34:55	-15.088322	-173.742359	5594	154	2	1535	We see a lava tube. Lavas have brecciated down slope.
2009/05/11 05:35:39	-15.088331	-173.742380	5596	154	4	1534	Anastamathas coral on a rock. Bright red.
2009/05/11 05:36:13	-15.088369	-173.742396	5597	155	4	1532	VIDEO Start recording HDCam
2009/05/11 05:36:44	-15.088389	-173.742373	5599	155	4	1529	Lots of lavas here. Could be a headwall. Looks like it's vertical. A scarp headwall.
2009/05/11 05:37:35	-15.088394	-173.742323	5600	156	6	1527	Looks like draping lava from sheet flows. Very fluid-looking lavas. Fan-shaped flows.
2009/05/11 05:37:46	-15.088401	-173.742310	5602	156	6	1527	Lots of mass wasting here of various scales.
2009/05/11 05:38:12	-15.088418	-173.742280	5603	157	8	1525	Vertical scarps everywhere. 10 + meters of relief on some of these scarps.
2009/05/11 05:38:58	-15.088466	-173.742225	5605	157	9	1522	We're heading S/SE up the slope.
2009/05/11 05:39:04	-15.088461	-173.742215	5606	157	9	1522	VIDEO Stop recording HDCam
2009/05/11 05:39:34	-15.088477	-173.742179	5607	157	6	1523	Talus and breccia down here either from the slides or original flows coming downslope. Nice debris field.
2009/05/11 05:39:46	-15.088488	-173.742177	5609	157	6	1521	Lots of rubble.
2009/05/11 05:40:17	-15.088504	-173.742153	5610	157	6	1519	Headwall to our right.
2009/05/11 05:40:56	-15.088525	-173.742198	5612	157	9	1517	Looks like a lobate crust on top of sheets. Only 1 m across or so.
2009/05/11 05:42:05	-15.088597	-173.742192	5614	157	5	1514	Took out a bunch of flow units downslope.
2009/05/11 05:42:20	-15.088600	-173.742172	5615	157	5	1513	Up on a flatter (relatively) surface.
2009/05/11 05:42:37	-15.088598	-173.742154	5616	157	8	1512	Chute off to the left.
2009/05/11 05:43:28	-15.088623	-173.742094	5618	159	5	1513	Talus within the sediment. A pile of pillow lavas to our left.
2009/05/11 05:44:04	-15.088613	-173.742061	5620	157	9	1508	A bunch of truncated pillow lavas with some of the tips broken off. Super steep here.
2009/05/11 05:45:20	-15.088657	-173.742019	5622	152	3	1505	Classic older pillows here. Lots of sediment between the pillows.
2009/05/11 05:45:47	-15.088664	-173.742017	5624	152	4	1503	Most of the broad areas that we see are probably in place.
2009/05/11 05:46:33	-15.088690	-173.742012	5625	152	4	1501	Still climbing up this north side of the rift zone to the ridge crest.
2009/05/11 05:46:45	-15.088696	-173.742006	5627	152	4	1500	Volcanically constructional rifts.
2009/05/11 05:47:09	-15.088700	-173.741991	5628	152	4	1499	First coral.
2009/05/11 05:48:09	-15.088718	-173.741979	5630	152	3	1499	Saw another Anastamathas coral.
2009/05/11 05:48:35	-15.088740	-173.741963	5631	154	5	1495	Drippy spider-web looking stuff all over the place.
2009/05/11 05:49:52	-15.088807	-173.741926	5634	126	3	1493	More gentle benches on these slopes can see a little bit of outcrop. Sheet flows and lobate flows.
2009/05/11 05:50:30	-15.088793	-173.741887	5635	145	4	1491	We are seeing vertically extruded lavas. Clague calls them haystacks.
2009/05/11 05:50:47	-15.088798	-173.741890	5637	149	4	1491	Coral again. New here.
2009/05/11 05:51:16	-15.088811	-173.741871	5638	159	2	1492	These types of flows are probably a function of the viscosity.
2009/05/11 05:52:06	-15.088812	-173.741866	5640	159	3	1492	Beautiful coral - a soft coral. It has a crab on the inside of it. HD Camera on.
2009/05/11 05:53:44	-15.088801	-173.741850	5643	157	2	1492	Chrysagorid corals are relatively common. Two galatheid crabs on the back. They live on only those corals.
2009/05/11 05:55:19	-15.088794	-173.741849	5645	152	3	1492	This is very old flow because the coral is really big. The corals grow very slowly.
2009/05/11 05:56:49	-15.088798	-173.741860	5648	148	4	1492	There are usually a pair of crabs per coral. That's their home. Tim has never seen the crabs off the coral - but thinks they leave and eat detritus.
2009/05/11 06:01:23	-15.088810	-173.741864	5653	150	3	1492	Removing markers from biobox to make room for coral.
2009/05/11 06:01:46	-15.088809	-173.741867	5655	150	3	1492	Dropped coral while attempting to pick it up.
2009/05/11 06:02:24	-15.088805	-173.741874	5656	148	3	1493	Second attempt at picking up coral which has fallen onto sand.
2009/05/11 06:02:45	-15.088803	-173.741877	5658	149	3	1493	Coral is still attached to a small piece of rock.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 06:05:26	-15.088790	-173.741883	5661	150	3	1492	SAMPLE Biology 2. **J418-coral-02**. Sample for Shank put into port biobox. Lat 15 5.328'S Long 173 44.513'W **[Climbing up from N to S - NE Rift Zone area]**
2009/05/11 06:06:01	-15.088790	-173.741877	5663	151	3	1492	J418-coral-02 cont. The rock that the coral was attached to will also be used by Rubin.
2009/05/11 06:06:10	-15.088790	-173.741875	5664	150	3	1492	VIDEO Stop recording HDCam
2009/05/11 06:06:32	-15.088791	-173.741871	5665	150	3	1492	Closing the biobox.
2009/05/11 06:07:47	-15.088796	-173.741860	5668	151	4	1492	Tim Shank is very excited by this specimen.
2009/05/11 06:08:55	-15.088803	-173.741859	5670	150	4	1492	Putting markers back in the basket.
2009/05/11 06:10:11	-15.088807	-173.741867	5672	150	4	1492	Still working on placing markers back into the basket. It is proving tricky.
2009/05/11 06:12:15	-15.088800	-173.741884	5675	150	3	1492	Still struggling with adjusting markers and covering the biobox.
2009/05/11 06:15:57	-15.088797	-173.741893	5680	150	3	1492	Closing biobox is proving to be too difficult. Markers are going to be wrapped around port arm and held to the side.
2009/05/11 06:18:06	-15.088821	-173.741849	5683	152	4	1489	Continuing on. Haystack lavas seen directly ahead. Moving up slope on to a flatter area.
2009/05/11 06:18:37	-15.088886	-173.741859	5684	152	3	1490	Contours are widening out. Some lavas with rippled sand between.
2009/05/11 06:19:21	-15.088960	-173.741803	5686	153	2	1490	Ripples could be regressive slumps in sediment. Tubular flows to the right side with lots of sediment.
2009/05/11 06:19:47	-15.088982	-173.741834	5688	155	3	1488	Pillows seen from the west located on the ridge.
2009/05/11 06:20:29	-15.089018	-173.741857	5689	156	3	1484	A big pile of tubular pillows some suspended. Embley is surprised they haven't broken off.
2009/05/11 06:20:36	-15.089023	-173.741861	5690	155	3	1484	VIDEO Start recording HDCam
2009/05/11 06:21:07	-15.089041	-173.741895	5692	155	3	1482	Running HD for 5-10 minutes to get some good footage of pillows.
2009/05/11 06:21:58	-15.089092	-173.741933	5694	156	2	1479	Some pillows have little drippings. Pillows not broken but intact which is interesting to Embley.
2009/05/11 06:22:27	-15.089121	-173.741947	5695	157	2	1478	Pillows covered with sediment and are thought to be older.
2009/05/11 06:22:54	-15.089157	-173.741960	5697	155	2	1477	Another outcrop ahead. More lobes.
2009/05/11 06:23:36	-15.089175	-173.741913	5698	163	4	1476	Lobes are oriented in all directions on slope. Some are hanging mid water. Pillows are flatter more lobate forms.
2009/05/11 06:24:54	-15.089213	-173.741884	5701	171	3	1476	Biology -- coral species Chrysagorid and a brittle star.
2009/05/11 06:25:14	-15.089218	-173.741880	5702	169	4	1475	Taking pictures and getting good look at coral.
2009/05/11 06:25:40	-15.089226	-173.741843	5704	172	5	1476	Continuing up slope. Lobate flows fanning out with broken pillows on top.
2009/05/11 06:26:39	-15.089270	-173.741815	5705	175	3	1475	Lobates are covered with sediment. Biology - coral species unknown.
2009/05/11 06:27:01	-15.089270	-173.741812	5707	176	4	1474	Plastic taffy looking lavas.
2009/05/11 06:27:32	-15.089284	-173.741832	5708	174	5	1472	Moving upslope heading 171.1
2009/05/11 06:28:23	-15.089284	-173.741829	5710	175	5	1472	Biology -- Anemone clinging to the bottom of suspended pillow.
2009/05/11 06:29:13	-15.089286	-173.741788	5712	177	6	1471	Embley is out of hot seat and replaced by Rubin. Scott and Tito also switched as pilot.
2009/05/11 06:29:34	-15.089293	-173.741773	5713	177	6	1471	Moving again upslope heading 176.9
2009/05/11 06:29:52	-15.089305	-173.741763	5715	216	7	1470	More pillows.
2009/05/11 06:30:30	-15.089330	-173.741734	5716	205	8	1468	More intact pillows moving downslope. Slightly more fluid than clastic pillows.
2009/05/11 06:30:53	-15.089364	-173.741717	5718	206	7	1467	Lava drips found on pillows. Smaller pillow tubes here.
2009/05/11 06:31:24	-15.089400	-173.741701	5719	203	5	1465	It's raining sideways outside so we are likely to get blown off course.
2009/05/11 06:31:55	-15.089430	-173.741698	5721	204	6	1463	Discussing taking a sediment and rock sample on the slope.
2009/05/11 06:32:22	-15.089447	-173.741707	5722	204	4	1464	Pillow with a nice bread crumb texture.
2009/05/11 06:32:58	-15.089486	-173.741721	5724	203	2	1461	Moving a meter or two ahead to drop markers which will be recovered after rock sampling.
2009/05/11 06:34:30	-15.089504	-173.741735	5726	203	2	1461	Biology - a cnidarian of some sort. The marker weight was placed right on top of cnidarian.
2009/05/11 06:35:19	-15.089493	-173.741733	5728	204	4	1461	Dropping remaining markers and returning to sample site. Shank seems to think he sees bryzonian in HD cam.
2009/05/11 06:36:41	-15.089475	-173.741730	5731	203	4	1464	A number of small web-like things growing on the overhangs of the pillow.
2009/05/11 06:38:54	-15.089463	-173.741719	5734	197	4	1464	SAMPLE Geology 3. **J418-sed-03**. Scoop sample of fine grained sediment located amongst the pillows for Clague. Scoop # 23. **[NE Rift Zone Area]**
2009/05/11 06:40:26	-15.089459	-173.741724	5736	203	3	1464	J418-sed-03 cont. A very fine grained sediment with maybe some volcaniclastics. Lat 15 5.369'S Long 173 44.503'W

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 06:41:27	-15.089461	-173.741728	5738	203	4	1464	J418-sed-03 cont. Bag is going behind the milk crate starboard side aft on porch.
2009/05/11 06:41:52	-15.089462	-173.741727	5740	204	4	1464	Attempting to take a rock sample by breaking it off a pillow.
2009/05/11 06:43:21	-15.089463	-173.741716	5742	202	4	1464	Observing some really fuzzy scummy rock.
2009/05/11 06:45:54	-15.089473	-173.741698	5746	202	5	1462	SAMPLE Geology 4. **J418-rock-04** Glassy pillow rind crust with staining on top shiny on the bottom. Sample for Rubin put in basket geobox 4a. **[NE Rift Zone]**
2009/05/11 06:47:09	-15.089504	-173.741730	5748	204	3	1461	J418-sed-04 cont. Lat 15 5.369'S Long 173 44.503'W
2009/05/11 06:49:02	-15.089522	-173.741765	5751	204	3	1461	Biology -- Anastamathas. Taking a number of pictures.
2009/05/11 06:49:27	-15.089525	-173.741768	5752	204	3	1461	Markers are in port arm.
2009/05/11 06:50:12	-15.089526	-173.741670	5754	173	4	1459	Moving on heading 183 upslope. Slope has become more gentle with lots of intact pillows.
2009/05/11 06:51:33	-15.089537	-173.741581	5756	174	6	1460	More intact pillows with more sediment in between. Stopping to cover up the geo boxes.
2009/05/11 06:52:05	-15.089538	-173.741569	5758	174	6	1460	Still futzing with the geoboxes.
2009/05/11 06:53:33	-15.089538	-173.741549	5760	174	6	1460	Boxes fixed and we are moving along. Resetting Sonar.
2009/05/11 06:54:24	-15.089558	-173.741516	5762	174	5	1463	Biology -- coral species Chrysagorid.
2009/05/11 06:55:39	-15.089603	-173.741467	5764	185	3	1463	Traversed a slope of 100 meters with mostly intact pillows. Biology small lollipop sponges about a dozen.
2009/05/11 06:55:44	-15.089603	-173.741470	5766	195	3	1463	VIDEO Start recording HDCam
2009/05/11 06:56:53	-15.089620	-173.741438	5768	206	9	1464	Observing large outcropping colonized with small lollipop sponges.
2009/05/11 06:57:15	-15.089625	-173.741409	5769	185	8	1465	Working up slope and increasing speed heading=185 Depth=1465m
2009/05/11 06:58:16	-15.089673	-173.741335	5771	170	2	1472	A decision has been made to move to the top and start moving faster unless hot water is seen. Seeing a lot of sand on a very flat surface.
2009/05/11 06:59:16	-15.089688	-173.741343	5773	230	7	1467	Reached top of ridge at point 'B'. Surface is covered with rippled sand. Depth=1471m Hdg=230
2009/05/11 06:59:49	-15.089712	-173.741385	5775	230	4	1466	A few rocky outcrops that don't look like an intact lava form.
2009/05/11 07:00:28	-15.089736	-173.741426	5776	247	8	1460	A couple of lobes and a little pillow. Approaching an escarpment. More sponges observed.
2009/05/11 07:00:59	-15.089764	-173.741469	5778	246	6	1456	VIDEO Stop recording HDCam A pillow hanging out in mid space.
2009/05/11 07:01:22	-15.089776	-173.741491	5779	249	7	1451	Pillows look more like a lobate form at the end of a stack.
2009/05/11 07:02:35	-15.089855	-173.741581	5781	246	3	1446	Flattened pillows not quite lobate flow. Old rocks with no hydrothermal staining.
2009/05/11 07:03:08	-15.089875	-173.741618	5783	247	3	1445	Pasty colonized outcrops with a rippled sediment.
2009/05/11 07:03:57	-15.089905	-173.741682	5785	246	4	1443	Lighter sediment is most likely less dense and could be made of sulfur species.
2009/05/11 07:04:26	-15.089920	-173.741716	5786	246	5	1440	Lava looks more spattered could be locally sourced creating ramparts.
2009/05/11 07:04:56	-15.089909	-173.741748	5788	243	4	1439	Jason is going to start zipping along much faster.
2009/05/11 07:05:40	-15.089917	-173.741771	5790	239	3	1439	Very spattery forms sticking out of the top of a sandy bottom.
2009/05/11 07:06:09	-15.089924	-173.741766	5791	237	2	1439	Sandy bottom with chaotic unevenly distributed ripples.
2009/05/11 07:07:22	-15.089982	-173.741809	5793	237	2	1439	Relatively flat here on top of the rift zone.
2009/05/11 07:08:29	-15.090045	-173.741876	5795	239	3	1437	Biology -- soft coral species Chrysagorid. Sandier flatter bottom.
2009/05/11 07:09:17	-15.090058	-173.741952	5797	254	1	1437	Small eruptive part of a lobate or folded sheet sticking out of sediment.
2009/05/11 07:10:23	-15.090105	-173.742017	5799	248	2	1438	Still moving up ridge heading=247.9 Could possibly date this sediment with K/Ar.
2009/05/11 07:11:14	-15.090143	-173.742092	5801	248	4	1436	Still seeing low relief surface with a few rocks poking out here and there. Plenty of ripples in the sand.
2009/05/11 07:12:06	-15.090177	-173.742157	5803	245	4	1435	Ripples changed direction. Moving over another small hill.
2009/05/11 07:13:04	-15.090225	-173.742265	5805	235	2	1435	Sonar displays a flat landscape with lots of little bumps of rocks. Some of the small depression we see could be filled from past volcanic events.
2009/05/11 07:13:38	-15.090263	-173.742303	5806	236	3	1433	Very small amount of rock outcropping but ridge is predominately sediment covered.
2009/05/11 07:13:43	-15.090258	-173.742307	5808	236	3	1432	VIDEO Start recording HDCam
2009/05/11 07:14:38	-15.090251	-173.742357	5809	187	2	1433	Little more of a spattery texture. Old rock very vesicular colonized with sponges.
2009/05/11 07:15:46	-15.090305	-173.742355	5812	227	4	1430	Outcropping made of rock that was highly gassed-charged. Very taffy-like texture.
2009/05/11 07:16:49	-15.090356	-173.742416	5814	230	4	1426	Moving on sandy bottom again with a couple of rocks. Small part of a broken pillow tube pretty old and stained.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 07:18:16	-15.090406	-173.742488	5816	244	4	1420	The skeleton of a once active lava flow. Approaching another rock structure of some small flattened lava tubes.
2009/05/11 07:19:21	-15.090459	-173.742564	5818	231	4	1415	Slope is very gentle on top of rift zone so most of the tubes have been covered with sediment. Collapsed lobate crust coming into view filled in with sand.
2009/05/11 07:20:20	-15.090493	-173.742661	5820	247	6	1407	Spattery looking lava in view again. Structure does not look as spattered as past lava.
2009/05/11 07:20:50	-15.090503	-173.742693	5822	247	2	1407	Some pillows are starting to poke out of the sand colonized by a few critters.
2009/05/11 07:21:56	-15.090535	-173.742748	5824	244	4	1403	Tubes look like they are flowing down the rift with some orange staining. Tubes look transitional to lobate.
2009/05/11 07:22:22	-15.090553	-173.742777	5825	246	5	1401	A little more spatter-looking lava forms.
2009/05/11 07:23:18	-15.090609	-173.742850	5827	246	5	1397	Moving up. Viewing sand deposits with intermittent rock lavas. Depth=1401m
2009/05/11 07:23:26	-15.090615	-173.742858	5828	245	6	1396	VIDEO Stop recording HDCam
2009/05/11 07:23:49	-15.090637	-173.742889	5830	246	6	1395	Debating speeding up as Jason moves up the ridge.
2009/05/11 07:24:27	-15.090682	-173.742950	5831	245	4	1393	Lobate flows in view with heavy volcaniclastic cover and ripples.
2009/05/11 07:25:30	-15.090729	-173.742976	5833	246	6	1388	More spattered rock forms from degassing lava. Chaotic pro-forms.
2009/05/11 07:26:12	-15.090758	-173.743021	5835	246	3	1387	Layered lava forms a foot or so thick. Sponges on top so lava is thought to be old.
2009/05/11 07:26:41	-15.090781	-173.743059	5837	245	5	1385	Some large pillow tubes more or less intact.
2009/05/11 07:27:31	-15.090786	-173.743100	5838	245	4	1383	Less sediment. Mostly lavas. Could be slightly younger. White hydrothermal stain on the rock.
2009/05/11 07:27:55	-15.090797	-173.743115	5840	246	5	1381	Coral and sponges are suddenly absent.
2009/05/11 07:28:42	-15.090837	-173.743167	5842	247	4	1377	More pillows on steep slope more or less intact running down slope in tubes.
2009/05/11 07:29:56	-15.090883	-173.743247	5844	247	3	1373	A few sponges still hanging out.
2009/05/11 07:30:43	-15.090936	-173.743300	5846	245	4	1367	Coming up onto a bench. Going to sample for a rock before lavas are covered with sediment.
2009/05/11 07:31:20	-15.090952	-173.743284	5847	240	2	1368	Searching for rock to sample.
2009/05/11 07:32:49	-15.090982	-173.743328	5850	238	2	1366	SAMPLE Geology 5. **J418-Rock-05**. Orange stained pillow fragment vesicular about 7-8 cm across. For Rubin. **[NE Rift Zone]**
2009/05/11 07:35:07	-15.091010	-173.743415	5853	239	4	1359	J418-Rock-05 cont. Orange stained pillow fragment. Vesicular 7-8 cm across. For Rubin. Lat 15 5.463'S Long 173 44.606'W
2009/05/11 07:35:38	-15.091008	-173.743418	5854	239	4	1359	J418-rock-05 cont. Put in geobox #5.
2009/05/11 07:36:33	-15.091059	-173.743506	5856	240	3	1357	Moving up slope at slightly speeded up rate heading 240. Bottom is now completely covered with light colored sediment.
2009/05/11 07:37:33	-15.091122	-173.743603	5858	241	4	1351	Sediment is very lightly rippled on top. Completely absent of macro biology.
2009/05/11 07:38:37	-15.091213	-173.743753	5860	241	3	1348	Moving over a bench of all volcanic sand. Just a few small rocks around. Bench is about 100 m long.
2009/05/11 07:39:02	-15.091238	-173.743779	5862	240	2	1349	Resing is discussing putting in the temp probe.
2009/05/11 07:40:11	-15.091299	-173.743846	5864	241	5	1347	Pillows in view. Possible flow front. Pillows are dusted with sediments.
2009/05/11 07:41:43	-15.091321	-173.743967	5867	247	2	1345	Reached another rock outcrop. Some broken up rock with pillows on the edges. No spattering.
2009/05/11 07:43:03	-15.091389	-173.744041	5869	238	2	1343	Big pillows in view. Some are split sideways. Lateral lobate-type forms. This is believed to be a flow front.
2009/05/11 07:44:09	-15.091421	-173.744107	5871	232	4	1338	Much coarser black sand dusting outcrops. Pillows are younger. No sessile animals present.
2009/05/11 07:44:48	-15.091462	-173.744140	5873	232	2	1338	VIDEO Start recording HDCam
2009/05/11 07:45:57	-15.091538	-173.744200	5875	237	3	1337	Drained out pillows in view filled with sediments and a crab. Coming up on some very large pillow forms a meter to a meter and a half long.
2009/05/11 07:47:15	-15.091638	-173.744323	5877	193	2	1335	Little flow lobes coming out shedding pillows to the side. More drained out pillows approaching.
2009/05/11 07:47:45	-15.091682	-173.744362	5879	221	3	1334	Pillow with mushroom growth as they extrude outward.
2009/05/11 07:48:45	-15.091750	-173.744412	5881	227	4	1330	Small sponges are still present. Continuous pillow flows on a steep slope one pillow flowing out of another.
2009/05/11 07:49:48	-15.091801	-173.744453	5883	204	1	1328	Resing thinks he sees a fresh contact.
2009/05/11 07:51:23	-15.091886	-173.744554	5885	230	3	1326	More mushroom and lobate shaped pillows. Biology -- fish (rat tail).
2009/05/11 07:52:06	-15.091889	-173.744639	5887	240	4	1325	Large pillows with lots of sediment that appears darker in color.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 07:53:03	-15.091939	-173.744743	5889	245	3	1321	Moving upslope heading 243 over large lobate pillow forms.
2009/05/11 07:53:38	-15.091949	-173.744779	5890	245	3	1320	Approaching a flat bench likely sediment covered.
2009/05/11 07:54:48	-15.091967	-173.744858	5893	188	2	1319	Interesting form in view. Fractured and inflated pillow. Lobe dripping over edge in background. Nice drained out pillow in view.
2009/05/11 07:55:33	-15.091992	-173.744910	5894	240	3	1316	Classic pillows with a few mushroom type in the mix.
2009/05/11 07:57:13	-15.092091	-173.745046	5897	240	3	1306	Approaching a flatter area which yields some flatter lobate forms covered with lots of sediments.
2009/05/11 07:58:19	-15.092094	-173.745096	5899	224	3	1306	Large pillow forms on top. Thick sediment covering flatter lava flows.
2009/05/11 08:00:09	-15.092255	-173.745223	5902	238	3	1300	Reached bench with lots of sand. More lobes with a mushroom shape on top.
2009/05/11 08:01:06	-15.092237	-173.745300	5904	255	4	1300	Another pillow flow front approaching. Pillows stacked on each other on a steep slope.
2009/05/11 08:01:37	-15.092242	-173.745311	5905	234	7	1297	Small possible fissure in view pointing 250.
2009/05/11 08:02:30	-15.092320	-173.745443	5907	242	3	1294	Following feature (possibly a tectonic fissure) to terminus.
2009/05/11 08:03:49	-15.092394	-173.745555	5910	242	2	1288	End of feature. Moved onto broken up pillow lavas and pillow fragments.
2009/05/11 08:04:40	-15.092445	-173.745645	5911	239	13	1293	Moving over large hole or drop off depth unknown.
2009/05/11 08:05:47	-15.092476	-173.745661	5914	241	6	1306	Moving down into depression. Could be a large slump or mass wasting to the north. Drops down at least 12-14 meters. Depth=1302m
2009/05/11 08:07:34	-15.092500	-173.745708	5916	238	4	1309	Embley thinks this is a large slide. Sediment found in the bottom. There is a medium-size yellow stained patch possibly hydrothermal.
2009/05/11 08:09:02	-15.092622	-173.745767	5919	231	1	1312	Looking for a place where patch is extensive enough to measure with a temp probe.
2009/05/11 08:09:55	-15.092636	-173.745756	5921	234	1	1312	VIDEO Start recording HDCam
2009/05/11 08:10:22	-15.092638	-173.745753	5922	234	1	1312	Looks like little pieces of mat and sulfur balls on the seafloor.
2009/05/11 08:11:50	-15.092638	-173.745750	5925	235	1	1312	Going to take the temp in this small spot of orange balls and mat (?) Temp=3.5 C
2009/05/11 08:12:04	-15.092637	-173.745750	5926	234	1	1312	Temp is flat-lining here. Nothing coming out here in the seds.
2009/05/11 08:14:02	-15.092625	-173.745745	5929	234	1	1312	Going to take temp in the little patch of orange stuff next to a rock.
2009/05/11 08:14:11	-15.092624	-173.745744	5930	235	1	1312	Scoria is a gas-charged vesicular bit of magma discharged from the vent and falls to the ground.
2009/05/11 08:14:35	-15.092623	-173.745740	5931	235	1	1312	No temp anomaly in this patch of what appears to be mat.
2009/05/11 08:14:54	-15.092623	-173.745739	5933	235	1	1312	Continuing SW up the ridge crest.
2009/05/11 08:17:17	-15.092786	-173.745938	5936	228	2	1306	Down on a semi-plateau here for a while.
2009/05/11 08:17:33	-15.092805	-173.745951	5937	228	2	1305	More tiny patches of orange material around the rocks.
2009/05/11 08:18:13	-15.092834	-173.745984	5939	228	3	1304	Jason watch change. Will coming on watch.
2009/05/11 08:21:03	-15.092817	-173.745940	5943	227	3	1304	VIDEO Stop recording HDCam
2009/05/11 08:23:40	-15.092933	-173.746162	5946	229	4	1286	Coming up to the break where the slope steepens. Seeing some larger particles in the water column.
2009/05/11 08:23:46	-15.092944	-173.746177	5948	228	4	1285	Broken pillow fragments.
2009/05/11 08:24:23	-15.093003	-173.746264	5949	229	4	1281	A bit of stain on the seafloor here. The broken rocks have a bit of staining on them.
2009/05/11 08:25:50	-15.093086	-173.746387	5952	228	4	1276	Patchy yellow material on the seafloor. Might have been mat at one time.
2009/05/11 08:26:30	-15.093123	-173.746375	5953	229	6	1274	More patches on the seafloor. Yellowish in color.
2009/05/11 08:28:22	-15.093242	-173.746413	5956	229	4	1270	Proceeding up the slope again. Seeing lots of broken rock - compared to what we saw earlier in the "pit".
2009/05/11 08:28:42	-15.093261	-173.746437	5958	228	5	1267	Out of place - breccia and Talus.
2009/05/11 08:31:02	-15.093122	-173.746570	5961	245	3	1263	Seeing larger blocks of breccia now. Still no visible outcrop boundary.
2009/05/11 08:32:11	-15.093140	-173.746720	5963	246	5	1254	We're looking for a piece of lava that may be in place.
2009/05/11 08:32:43	-15.093124	-173.746778	5965	245	4	1252	On the right here we see some outcrop. We want to get a rock here and a sediment scoop for Clague.
2009/05/11 08:33:58	-15.093112	-173.746791	5967	289	5	1250	Now we're looking at a flow front. Looks like it's in place - little doubt about it.
2009/05/11 08:34:32	-15.093115	-173.746809	5968	295	3	1251	VIDEO Start recording HDCam
2009/05/11 08:36:36	-15.093117	-173.746763	5971	296	6	1249	SAMPLE Geology 6. **J418-rock-06**. Small piece of pillow crust very glassy. From lip of glassy pillow. 2cm glass rind. 6 cm long. **[NE Rift Zone]**

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 08:38:30	-15.093102	-173.746738	5974	296	6	1249	418-rock-06 cont. This sample is from the outcrop ridge that we came upon after traveling along a relatively flat "pit" feature for 100m. Placed in geobox 8a. PI Rubin.
2009/05/11 08:39:58	-15.093106	-173.746800	5977	301	6	1244	A white fish just swam by.
2009/05/11 08:41:23	-15.093136	-173.746913	5979	279	6	1237	Upslope about 5m from the sample. Lat 15 5.582'S Long 173 44.810'W Depth=1252m
2009/05/11 08:41:49	-15.093140	-173.746920	5981	279	6	1237	Going to take a sediment sample for Clague here now.
2009/05/11 08:43:11	-15.093136	-173.746933	5983	282	3	1239	SAMPLE Geology 7. **J418-sed-07**. Sediment scoop of volcaniclastic seds just upslope from sample 6. PI Clague. **[NE Rift Zone]**
2009/05/11 08:44:28	-15.093108	-173.746919	5985	282	4	1237	J418-sed-07 cont. Sediments are dark volcaniclastic. Green scoop bag - not sure of the number but it looks like "8".
2009/05/11 08:45:42	-15.093096	-173.746921	5988	264	5	1237	J418-sed-07 cont. Full sample bag. Finished sample. Lat 15 5.586'S 173 44.815'W Depth=1238m
2009/05/11 08:46:50	-15.093153	-173.747001	5990	224	4	1235	Starting up slope again.
2009/05/11 08:47:08	-15.093198	-173.747003	5991	235	5	1235	Sediments covering the underlying tubular pillow features.
2009/05/11 08:48:10	-15.093298	-173.747142	5993	236	3	1232	Seeing more and more outcrops. Beautiful sheet-like flow. There's a hole in it and it appears to be hollow.
2009/05/11 08:49:02	-15.093376	-173.747211	5995	236	4	1232	Large area of drained out sheet flow. More fluid lavas here which indicates higher eruption rate. Pillows around the sheet flow.
2009/05/11 08:52:30	-15.093320	-173.747250	5999	234	7	1231	The pillows on top of the sheet flow are probably fragments.
2009/05/11 08:52:39	-15.093304	-173.747266	6000	235	6	1231	Sitting here waiting for the ship to catch up.
2009/05/11 08:55:05	-15.093078	-173.747240	6004	235	4	1231	Pretty pillows here that are intact with the ends intact.
2009/05/11 08:56:10	-15.093022	-173.747229	6006	233	4	1231	Looking at a little red shrimp and a white itty bitty holothurian.
2009/05/11 08:56:46	-15.092984	-173.747228	6008	237	5	1230	Large drained-out pillow features draping down this relatively steep slope.
2009/05/11 08:56:54	-15.092973	-173.747233	6009	237	6	1230	Vertical wall of pillows.
2009/05/11 08:57:41	-15.092956	-173.747297	6010	238	9	1229	VIDEO Stop recording HDCam
2009/05/11 08:59:24	-15.093072	-173.747407	6013	238	6	1214	Coming up upon more outcrop. Approaching the place where we started dive J414.
2009/05/11 09:00:23	-15.093141	-173.747438	6015	237	3	1213	We're up 5m above the bottom. Can't see much.
2009/05/11 09:00:36	-15.093161	-173.747453	6016	236	4	1212	Dropping down and now the bottom is in sight again.
2009/05/11 09:02:04	-15.093247	-173.747593	6019	238	4	1212	We're on the north side of the ridge crest (barely).
2009/05/11 09:02:19	-15.093261	-173.747622	6020	238	5	1211	Large outcrops with volcaniclastic seds here.
2009/05/11 09:03:16	-15.093289	-173.747668	6022	237	7	1207	More large particles in the water. Polychaetes in the water. Rattail underneath us.
2009/05/11 09:04:01	-15.093316	-173.747731	6024	237	5	1202	Steep outcrops here with sidewall. It's raining polychaetes.
2009/05/11 09:04:42	-15.093346	-173.747784	6025	237	3	1199	Hoodoos of volcanic rock. Erosional remnant of whatever the material was.
2009/05/11 09:04:46	-15.093350	-173.747790	6027	237	3	1199	VIDEO Start recording HDCam
2009/05/11 09:05:27	-15.093395	-173.747854	6028	236	4	1198	Wall on our left is probably the summit ridge.
2009/05/11 09:06:24	-15.093446	-173.747904	6030	238	5	1194	Orange staining on the rocks here. Probably much fresher flows here.
2009/05/11 09:06:36	-15.093451	-173.747907	6031	237	5	1194	They are not glassy.
2009/05/11 09:07:40	-15.093483	-173.747949	6033	239	2	1194	VIDEO Stop recording HDCam
2009/05/11 09:09:53	-15.093546	-173.747989	6037	192	10	1195	We're approaching the summit.
2009/05/11 09:14:06	-15.093622	-173.747999	6042	157	6	1194	We're crossing the rift zone. Going on the south side of the rift zone instead of the north where we have been focused.
2009/05/11 09:14:52	-15.093651	-173.747975	6044	163	5	1193	The HD cam is on.
2009/05/11 09:15:52	-15.093656	-173.747950	6046	164	5	1193	We see some shimmering water here.
2009/05/11 09:16:05	-15.093655	-173.747952	6047	164	4	1193	We're about 30m west of Kohu.
2009/05/11 09:16:31	-15.093656	-173.747957	6048	164	4	1193	Julie is in the hot seat.
2009/05/11 09:17:58	-15.093640	-173.747987	6051	164	4	1193	Jason to Kohu is 28m bearing 100. Going to settle down and do some water sampling.
2009/05/11 09:18:36	-15.093629	-173.748000	6052	164	4	1193	Lots of shimmering water.
2009/05/11 09:21:40	-15.093629	-173.747954	6056	171	2	1194	The rock has some white material and olive around the border of the white.
2009/05/11 09:22:24	-15.093636	-173.747938	6058	172	2	1194	We see red staining (?) on the rocks. There is also white sulfur here too.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 09:23:19	-15.093641	-173.747931	6060	172	2	1194	Stirred up a bit of flock here. The red stuff is all mat. The iron mats hold together in clumps. The white ones are like threads (epsilon threads).
2009/05/11 09:23:50	-15.093642	-173.747936	6062	172	2	1194	Taking the temp here.
2009/05/11 09:24:50	-15.093639	-173.747957	6064	172	2	1194	Manipulating the wand around. Still going up T2 is climbing and it is still working.
2009/05/11 09:26:07	-15.093636	-173.747985	6066	172	2	1194	Temp is 28.5 C now. Ambient temp=3.9 Lots of flow here.
2009/05/11 09:27:45	-15.093644	-173.747986	6069	172	2	1194	pH=7.7 It's high.
2009/05/11 09:28:50	-15.093649	-173.747969	6071	172	2	1194	Setting up to fluid sample here.
2009/05/11 09:31:44	-15.093636	-173.747961	6075	172	2	1194	SAMPLE Fluid 8. **J418-HFS-08**. Unfiltered bag #21. Start 0930. Area of strong diffuse flow. Orange and white mat on the rocks. Flat line of about 29C. **[Area dubbed "Creamsicle"]**
2009/05/11 09:33:52	-15.093630	-173.747978	6078	172	2	1194	J418-HFS-08 cont. Tmax=29.3 Tavg=29.1 Vol=550ml
2009/05/11 09:35:42	-15.093634	-173.747969	6080	172	2	1194	SAMPLE Fluid 9. **J418-HFS-09**. Filtered bag #19. Start 0934. **[Creamsicle]**
2009/05/11 09:37:06	-15.093638	-173.747952	6083	172	2	1194	Going to call this place "**Creamsicle**" because it has orange and white rocks. This vent is the same temp as the surface seawater.
2009/05/11 09:38:08	-15.093644	-173.747941	6085	172	2	1194	J418-HFS-09 cont. Stop 0937. Tmax=29.3 Tavg=29.1 Vol=550ml
2009/05/11 09:40:17	-15.093658	-173.747941	6088	172	2	1194	SAMPLE Fluid 10. **J418-HFS-10**. Sterivex filter #15. Start 0938. **[Creamsicle]**
2009/05/11 09:42:43	-15.093647	-173.747978	6091	172	2	1194	J418-HFS-10 cont. Creamsicle position is Lat 15 5.6186'S 173 44.873'W Depth=1195m
2009/05/11 09:43:37	-15.093639	-173.747984	6093	172	2	1194	J418-HFS-10 cont. Seeing a few shrimp. Not sure where they are coming from. Will have to look around after we sample.
2009/05/11 09:43:57	-15.093637	-173.747984	6095	172	2	1194	There are a few shrimp around here.
2009/05/11 09:52:38	-15.093627	-173.747971	6104	172	2	1194	The white mat is not long filamentous but you can see a bit of filament.
2009/05/11 09:58:28	-15.093640	-173.747977	6111	172	2	1194	J418-HFS-10 cont. Stop 0954. Tmax=29.2 Tavg=20 Vol=3liters. pH is ~7.5
2009/05/11 09:58:37	-15.093638	-173.747979	6112	172	2	1194	NAV Doppler reset
2009/05/11 10:01:23	-15.093608	-173.747992	6116	172	2	1194	Will deploy a marker here. Stowing the wand.
2009/05/11 10:03:14	-15.093630	-173.747975	6119	171	3	1193	Doing a bit of housekeeping here.
2009/05/11 10:03:20	-15.093632	-173.747972	6120	170	3	1193	VIDEO Start recording HDCam
2009/05/11 10:03:35	-15.093636	-173.747972	6121	169	3	1193	Looking over this site.
2009/05/11 10:03:52	-15.093642	-173.747967	6123	169	3	1193	The venting here is quite extensive.
2009/05/11 10:06:55	-15.093661	-173.747937	6127	169	3	1193	The heading during the fluid samples was 172 degrees and depth was 1194m. Sampling at Creamsicle.
2009/05/11 10:08:26	-15.093636	-173.747952	6129	139	3	1194	Steep cliff face here at Creamsicle.
2009/05/11 10:09:04	-15.093628	-173.747957	6131	143	3	1194	**DEPLOY Marker 2. Little round marker #2 - at Creamsicle.**
2009/05/11 10:10:21	-15.093634	-173.748005	6133	115	9	1190	Going to explore a bit more. Heading 50 m SE of here to explore a little bit more. Want to get to the summit and hopefully to the south of it in an area we haven't covered yet.
2009/05/11 10:11:29	-15.093618	-173.747904	6135	120	7	1187	Sheet flows and pillows coming down the steep slope.
2009/05/11 10:12:00	-15.093634	-173.747883	6137	120	4	1185	Hydrothermal seds on the pillows.
2009/05/11 10:12:23	-15.093660	-173.747830	6138	119	3	1183	Pillows with lots of yellow iron oxide mats underneath.
2009/05/11 10:12:45	-15.093681	-173.747789	6140	117	2	1184	Coming over the edge of one of these high ridges.
2009/05/11 10:12:54	-15.093684	-173.747795	6141	118	2	1184	NAV Lost bottom lock
2009/05/11 10:14:43	-15.093732	-173.747736	6143	122	2	1185	We are flying pretty high.
2009/05/11 10:15:20	-15.093750	-173.747730	6145	156	1	1188	We should be climbing here.
2009/05/11 10:15:36	-15.093750	-173.747729	6146	156	1	1188	Nice truncated pillows.
2009/05/11 10:18:25	-15.093790	-173.747686	6150	211	4	1189	That's a rattail. Crabbing along the slope looking things over. Going generally SE at this time.
2009/05/11 10:19:57	-15.093869	-173.747676	6153	213	5	1190	Pretty smoky around here.
2009/05/11 10:22:00	-15.093894	-173.747519	6156	215	5	1204	Looking around here for more signs of venting. More polychaetes. Continuing to the southeast - at least that's what we want.
2009/05/11 10:22:15	-15.093897	-173.747514	6157	213	4	1205	Not seeing any signs of venting.
2009/05/11 10:25:15	-15.093969	-173.747452	6161	263	3	1207	We're sort of at the **nose of the summit** here.
2009/05/11 10:25:51	-15.093994	-173.747446	6163	259	3	1208	We're at the crestline here and starting to drop over the crest.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 10:27:24	-15.094026	-173.747451	6165	191	2	1208	Waiting for Medea to catch up.
2009/05/11 10:29:57	-15.093997	-173.747474	6169	192	2	1208	Galatheid crab parachuted by.
2009/05/11 10:31:17	-15.093957	-173.747476	6171	192	2	1208	There was a polychaete that swam by. Lots of stuff in the water.
2009/05/11 10:32:11	-15.093961	-173.747473	6173	209	3	1208	Moving again to the south. Now **just south of the summit ridge.**
2009/05/11 10:33:16	-15.093998	-173.747475	6175	211	4	1208	Smoke in the distance.
2009/05/11 10:33:54	-15.094043	-173.747465	6177	210	4	1208	See a lot more sediment here but doesn't look as black. Some debris in the seds. No big lava outcrops here.
2009/05/11 10:35:39	-15.094129	-173.747486	6179	223	3	1210	Correction: Seeing lots of volcaniclastic seds here covering slopes.
2009/05/11 10:35:55	-15.094140	-173.747486	6181	222	4	1210	Covered with volcanic sand.
2009/05/11 10:36:40	-15.094154	-173.747481	6182	223	3	1210	Right up near the summit on the south side. Ken wants something that is a bit older.
2009/05/11 10:38:31	-15.094161	-173.747466	6185	221	5	1208	SAMPLE Geology 11. **J418-rock-11**. Small pillow fragment. Vesicular glassy rind. Orange staining. Going into 7B. **[near summit - south side]**
2009/05/11 10:40:01	-15.094162	-173.747468	6188	223	5	1208	J418-rock-11 cont. Older looking lavas here on the north side of the summit. Lat 15 5.649'S Long 173 44.850'W depth=1209m
2009/05/11 10:41:29	-15.094158	-173.747486	6190	238	5	1208	Want to head to Red Rock Ridge over the bottom.
2009/05/11 10:42:21	-15.094174	-173.747526	6192	238	9	1201	Heading to Red Rock Ridge now. Lots of volcaniclastic sediments here. Coming up hill.
2009/05/11 10:43:05	-15.094204	-173.747587	6194	238	3	1196	Looks like a bit of an overhang. This is incredibly steep at the summit. Seeing a bit of staining here.
2009/05/11 10:44:01	-15.094227	-173.747645	6196	239	10	1185	Travelling oblique to the summit. Truncated lavas.
2009/05/11 10:44:25	-15.094251	-173.747683	6197	241	10	1179	Beautiful truncated flows.
2009/05/11 10:44:47	-15.094255	-173.747692	6199	239	5	1177	**At the top of the ridge now**. More mat now.
2009/05/11 10:45:36	-15.094305	-173.747806	6200	238	3	1175	Big pile of clastics up at the top of this volcano.
2009/05/11 10:45:45	-15.094308	-173.747810	6202	238	3	1175	Bottom out of sight temporarily.
2009/05/11 10:47:20	-15.094342	-173.748067	6204	240	3	1177	Extensive mat/staining on the surface. Orange-ish staining on the rocks.
2009/05/11 10:50:18	-15.094355	-173.748109	6208	241	2	1175	There are some shrimp here.
2009/05/11 10:50:24	-15.094357	-173.748109	6209	243	2	1175	Ophedid.
2009/05/11 10:50:59	-15.094391	-173.748146	6211	241	5	1172	Big fish in front of us (ophedid).
2009/05/11 10:55:58	-15.094495	-173.748427	6217	239	2	1173	White staining present
2009/05/11 10:58:53	-15.094581	-173.748571	6221	72	3	1181	Looking for Red Rock Ridge and diffuse flow to sample.
2009/05/11 11:04:51	-15.094566	-173.748366	6228	64	4	1180	We are right at position noted from dive 417 and not seeing the vent area.
2009/05/11 11:06:29	-15.094522	-173.748400	6230	25	3	1179	Definitely looking at steep rock outcrop with red staining covered with black sand but not seeing any venting yet.
2009/05/11 11:06:55	-15.094554	-173.748420	6232	334	6	1179	Sediments are easily disturbed and churned up by Jason moving around.
2009/05/11 11:08:51	-15.094517	-173.748580	6235	37	5	1178	Slope is heavily covered with black volcaniclastic sand.
2009/05/11 11:16:05	-15.094674	-173.748611	6243	260	3	1188	Rocks are all encrusted with orange and white mat or deposit but not seeing any venting.
2009/05/11 11:17:01	-15.094705	-173.748776	6245	242	2	1199	**Abandoning search for Red Rock Ridge for the time being.** We will go deploy the hydrophone then come back and look again.
2009/05/11 11:18:21	-15.094729	-173.748901	6247	242	5	1198	Heading is 244. We should be about 40m from Hades.
2009/05/11 11:18:46	-15.094737	-173.748917	6249	244	7	1197	Lots of pyroclastic sand covering rocks here.
2009/05/11 11:21:55	-15.094710	-173.748870	6253	244	5	1196	Medea camera seeing Hades plume
2009/05/11 11:22:44	-15.094701	-173.748856	6254	244	9	1191	Rattail fish swimming along ledge
2009/05/11 11:23:25	-15.094754	-173.748928	6256	237	8	1191	Jason is in Hades plume. Plume is increasing. Visibility dropping.
2009/05/11 11:23:54	-15.094783	-173.748982	6258	235	2	1191	Big blanket of volcaniclastic sands here.
2009/05/11 11:25:33	-15.094957	-173.749178	6260	230	17	1197	Plume in Medea camera is quite big
2009/05/11 11:27:02	-15.094989	-173.749118	6263	235	6	1212	Jason was not close enough to the seafloor to see anything. Descending further now.
2009/05/11 11:27:18	-15.094999	-173.749109	6264	236	6	1212	Seafloor in sight
2009/05/11 11:27:35	-15.095010	-173.749111	6265	236	7	1212	Big pile of broken pillows.
2009/05/11 11:28:54	-15.095019	-173.749085	6268	47	8	1211	Looking for a flat spot that is not all sand for placing the hydrophone.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 11:31:48	-15.094896	-173.749020	6272	31	14	1197	Lobate flows present covered with blanket of volcaniclastic sands. Very steep slope.
2009/05/11 11:33:21	-15.094843	-173.749078	6274	298	3	1192	Cannot put hydrophone on sand for fear of slides.
2009/05/11 11:37:24	-15.094785	-173.749213	6279	350	4	1199	Think we are on south side of ridge. Want to climb this slope to find lavas at top to deploy hydrophone.
2009/05/11 11:39:41	-15.094661	-173.749138	6282	19	1	1198	**Hades is in sight.**
2009/05/11 11:41:24	-15.094656	-173.749149	6285	20	1	1198	Setting Jason down - good site for hydrophone.
2009/05/11 11:43:08	-15.094684	-173.749200	6288	20	1	1198	**DEPLOY Hydrophone** Setting hydrophone on seafloor.
2009/05/11 11:43:18	-15.094687	-173.749205	6289	20	1	1198	In view of Hades
2009/05/11 11:45:22	-15.094739	-173.749230	6292	20	1	1198	LBL position: Lat 15 5.682'S Long 173 44.954'W
2009/05/11 11:45:44	-15.094746	-173.749228	6293	20	1	1198	**DEPLOY Marker 49** placed about 1 meter west of hydrophone.
2009/05/11 11:46:04	-15.094751	-173.749227	6295	20	1	1198	Can clearly see Hades vent from here.
2009/05/11 11:47:08	-15.094758	-173.749217	6297	20	1	1198	While hydrophone is sitting here will go closer to Hades and make some simultaneous observations.
2009/05/11 11:47:49	-15.094768	-173.749218	6299	21	2	1198	Picture of hydrophone and marker in foreground with Hades in background
2009/05/11 11:48:55	-15.094665	-173.749185	6301	36	5	1197	VIDEO Start recording HDCam
2009/05/11 11:50:06	-15.094597	-173.749179	6306	74	6	1199	**Area has several areas of smoke coming out of rocks.** Most vigorous plume with tephra roiling in plume is over to left side. Jason heading is 075
2009/05/11 11:51:44	-15.094535	-173.749160	6308	98	5	1200	Smoke coming out of pile of rubble. Plumes coming from several individual spots
2009/05/11 11:52:56	-15.094510	-173.749159	6311	148	6	1200	Most active plume appears to be at a different spot then yesterday. Tephra coming out of the most active plume.
2009/05/11 11:53:44	-15.094500	-173.749151	6312	168	4	1201	We are seeing bubbles.
2009/05/11 11:55:59	-15.094482	-173.749157	6316	183	3	1201	Seems to be a large mound with smoke coming out of many discrete places as well as some areas where smoke is diffusing through clastic pile.
2009/05/11 11:56:47	-15.094474	-173.749148	6318	186	3	1201	Bubbles are very occasional
2009/05/11 11:58:05	-15.094479	-173.749139	6320	185	3	1201	Things much more quiescent than previous visits
2009/05/11 11:58:45	-15.094492	-173.749135	6321	185	3	1201	Bubbles seem to be coming out from near lava spine to right of this view
2009/05/11 12:00:39	-15.094542	-173.749138	6324	186	3	1201	Sitting and observing vent. Jason Depth=1202m Heading=186
2009/05/11 12:02:24	-15.094564	-173.749135	6327	204	1	1201	Lots of yellow smoke coming out of the pile of rubble.
2009/05/11 12:04:58	-15.094576	-173.749184	6331	96	5	1200	Most vigorous part of plume at top of rocky area .
2009/05/11 12:05:42	-15.094571	-173.749178	6332	96	5	1200	Plume is really yellow.
2009/05/11 12:08:19	-15.094565	-173.749171	6336	97	5	1200	Rocks raining out of plume.
2009/05/11 12:09:28	-15.094562	-173.749174	6338	96	5	1200	Observing and photographing vent
2009/05/11 12:10:51	-15.094555	-173.749173	6341	96	5	1200	Not nearly as much clastic material being thrown up into water above vent. But occasional rock pieces coming out of plume.
2009/05/11 12:10:58	-15.094555	-173.749172	6342	96	5	1200	No red flashes today.
2009/05/11 12:12:02	-15.094549	-173.749168	6344	97	5	1200	Not seeing vent shut off and pulse as we saw yesterday. It is more continuous today.
2009/05/11 12:13:20	-15.094543	-173.749186	6346	97	5	1201	Just saw slight slide of rocks down cone in one camera view (brow cam).
2009/05/11 12:14:26	-15.094543	-173.749184	6348	98	5	1201	Just beneath where slide was there is a pile of blocks of lava.
2009/05/11 12:15:26	-15.094547	-173.749170	6350	98	4	1201	Definitely see bubbles here
2009/05/11 12:16:22	-15.094544	-173.749168	6352	98	4	1201	Fairly strong current blowing the plume to the north
2009/05/11 12:16:38	-15.094544	-173.749167	6353	98	4	1201	We are going to do some fluid sampling now
2009/05/11 12:22:51	-15.094602	-173.749171	6361	83	4	1201	Evaluating where is best place to take fluid samples
2009/05/11 12:26:58	-15.094583	-173.749180	6366	82	4	1201	Removing fluid sampler wand
2009/05/11 12:27:31	-15.094584	-173.749176	6367	82	3	1201	Want to try to keep nozzle clean - do not ram into sediments.
2009/05/11 12:28:41	-15.094590	-173.749169	6369	82	3	1201	Pump is on
2009/05/11 12:28:49	-15.094591	-173.749169	6371	82	3	1201	Temperature is increasing

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 12:32:06	-15.094588	-173.749141	6375	82	3	1201	SAMPLE Fluid Temp went up to 55 while wand was in plume but did not take sample. Trying to keep wand from clogging but that also makes it harder to keep it in plume. Occasional bubbles coming out of sand in front of plumes.
2009/05/11 12:33:43	-15.094580	-173.749146	6377	82	3	1201	SAMPLE Fluid 12. **J418-HFS-12**. Piston #1 Unfiltered. T1 up to 59. Starting now. **[Hades]**
2009/05/11 12:34:43	-15.094582	-173.749155	6379	83	3	1201	J418-HFS-12 cont. Good flow of exhaust.
2009/05/11 12:35:25	-15.094587	-173.749163	6381	82	3	1201	**J418-GTB-13**. Port Gastight fired and retracted. Done. **[Hades]**
2009/05/11 12:36:05	-15.094593	-173.749170	6383	82	3	1201	J418-HFS-12 cont. Flush pump stopped momentarily. Getting started again.
2009/05/11 12:36:18	-15.094594	-173.749173	6384	82	3	1201	J418-HFS-12 cont. Stopped piston#1.
2009/05/11 12:36:57	-15.094597	-173.749178	6386	82	3	1201	J418-HFS-12 cont. Sampled at Hades vent. Tmax=58 Tavg=48.3 Vol=425ml Depth=1202m
2009/05/11 12:38:05	-15.094593	-173.749183	6388	82	3	1201	SAMPLE Fluid 14. **J418-HFS-14**. Filtered piston #2 started. **[Hades]**
2009/05/11 12:38:34	-15.094588	-173.749183	6389	82	3	1201	J418-HFS-14 cont. Good exhaust.
2009/05/11 12:39:54	-15.094571	-173.749179	6392	82	3	1201	J418-HFS-14 cont. Pump had stopped itself. Shows slow flow rate at exhaust
2009/05/11 12:40:25	-15.094567	-173.749176	6393	82	3	1201	J418-HFS-14 cont. Dave slowed down pump rate a little and now it's working better.
2009/05/11 12:40:46	-15.094565	-173.749173	6395	82	3	1201	J418-HFS-14 cont. Stopped.
2009/05/11 12:41:18	-15.094565	-173.749168	6396	82	3	1201	J418-HFS-14 cont. Tmax=76 Tavg=60 Vol=350ml.
2009/05/11 12:41:56	-15.094568	-173.749163	6398	82	3	1201	J418-HFS-14 cont. Lat 15 5.674'S 173 44.951'W
2009/05/11 12:43:04	-15.094578	-173.749155	6400	82	3	1201	J418-HFS-14 cont. Confirm filtered Piston#2 is sample J418-HFS-14.
2009/05/11 12:43:53	-15.094584	-173.749153	6402	82	3	1201	SAMPLE Fluid 15. **J418-HFS-15**. Filtered Piston #4. Started. **[Hades]**
2009/05/11 12:44:39	-15.094588	-173.749155	6403	82	3	1201	J418-HFS-15 cont. Exhaust flow looks good.
2009/05/11 12:46:09	-15.094589	-173.749164	6406	81	3	1201	J418-HFS-15 cont. Stopped.
2009/05/11 12:47:11	-15.094589	-173.749168	6408	81	3	1201	J418-HFS-15 cont. Tmax=74 Tavg=58.5 T2~11 Vol=485ml.
2009/05/11 12:48:46	-15.094589	-173.749170	6411	81	3	1201	SAMPLE Fluid 16. **J418-HFS-16**. Filtered bag#18 started. **[Hades]**
2009/05/11 12:50:41	-15.094591	-173.749163	6413	80	3	1201	J418-HFS-16 cont. Stopped
2009/05/11 12:51:11	-15.094592	-173.749162	6415	80	3	1201	J418-HFS-16 cont. Tmax=76.2 Tavg=53.9 Vol=183ml T2~11
2009/05/11 12:56:57	-15.094577	-173.749146	6422	80	3	1201	J418-HFS-16 cont. Looking at other HFS sensors. pH=1.24 There might also actually be some sulfide (H2S) in this one too H2S=1.62volts
2009/05/11 12:57:27	-15.094580	-173.749148	6423	80	3	1201	Removing wand from plume
2009/05/11 12:57:38	-15.094581	-173.749149	6424	79	3	1201	Tip looks fine
2009/05/11 12:58:22	-15.094587	-173.749155	6426	79	3	1201	Reversing pump to flush system.
2009/05/11 13:01:09	-15.094595	-173.749173	6430	79	3	1201	Want to take temperature by pushing Jason temp probe into sand.
2009/05/11 13:03:16	-15.094600	-173.749164	6433	81	3	1201	Sticking temp probe into sand not far from vent.
2009/05/11 13:03:58	-15.094602	-173.749159	6435	80	3	1201	One of the vents in the background is exploding and more tephra is raining out of "sky"
2009/05/11 13:04:23	-15.094604	-173.749154	6436	80	3	1201	Temp=4.0
2009/05/11 13:04:42	-15.094604	-173.749152	6437	79	3	1201	Tephra still falling all around.
2009/05/11 13:06:00	-15.094601	-173.749150	6440	79	3	1201	Temperature probe in smoking ground. Getting warmer. Just few tens of centimeters from where temp was measured in sand just prior to this measurement.
2009/05/11 13:06:31	-15.094599	-173.749148	6441	79	3	1201	Tephra event is pretty intense.
2009/05/11 13:07:12	-15.094593	-173.749154	6443	79	3	1201	Temp in white smoke spot (to right of where we were sampling before). Tmax=114
2009/05/11 13:09:00	-15.094588	-173.749161	6446	78	3	1201	Temperature in ground directly beneath where fluid sample was taken. Tmax=162
2009/05/11 13:10:21	-15.094599	-173.749156	6448	78	3	1201	Trying one more spot. Tmax=95
2009/05/11 13:12:18	-15.094615	-173.749156	6451	79	3	1201	Taking one more temp in gravel just outside plume Tmax=5.7
2009/05/11 13:12:30	-15.094615	-173.749156	6452	79	3	1201	Want to take a gastight
2009/05/11 13:12:42	-15.094615	-173.749159	6453	79	3	1201	Tephra has stopped coming down
2009/05/11 13:12:57	-15.094615	-173.749163	6455	81	3	1201	Or at least diminished
2009/05/11 13:14:14	-15.094599	-173.749179	6457	81	3	1201	Removing gastight from basket. Green gastight.
2009/05/11 13:16:05	-15.094575	-173.749190	6460	81	3	1201	VIDEO Start recording HDCam
2009/05/11 13:17:33	-15.094578	-173.749174	6462	81	3	1201	VIDEO Stop recording HDCam

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 13:20:26	-15.094599	-173.749157	6466	81	3	1201	**J418-GTB-17**. Green gastight. Hades vent. At same position as all the fluid samples (sample numbers 12-16). Fired now. **[Hades]**
2009/05/11 13:21:12	-15.094597	-173.749160	6468	81	3	1201	J418-GTB-17. Occasional bubbles seen.
2009/05/11 13:21:28	-15.094596	-173.749162	6469	81	3	1201	17. J418-gas-17 cont. Done
2009/05/11 13:24:11	-15.094594	-173.749167	6473	81	3	1201	This position applies to all the fluid and gastight samples here at Hades: Depth=1202m Lat 15 5.674'S Long 173 44.950'W
2009/05/11 13:24:36	-15.094595	-173.749162	6474	81	3	1201	***NAV Doppler reset***
2009/05/11 13:26:01	-15.094567	-173.749176	6477	141	7	1199	Moving away from Hades vent site
2009/05/11 13:28:22	-15.094511	-173.749174	6480	155	8	1199	Now we can see flaming at base of more active plume at top of mound
2009/05/11 13:28:44	-15.094507	-173.749182	6481	154	7	1199	Tephra falling out of that part of plume as well
2009/05/11 13:29:03	-15.094513	-173.749194	6483	127	6	1199	**Moving Jason around mound to see different parts of the vent site**
2009/05/11 13:29:15	-15.094522	-173.749202	6484	129	7	1199	Some explosions
2009/05/11 13:30:49	-15.094585	-173.749173	6487	37	5	1199	VIDEO Start recording HDCam
2009/05/11 13:31:26	-15.094608	-173.749154	6488	22	4	1199	Circling around vent site to photograph. Can see hydrophone marker in aft cam.
2009/05/11 13:31:53	-15.094627	-173.749154	6490	24	4	1199	Looking at vent. Heading of 023 Jason is at Depth=1200m
2009/05/11 13:32:37	-15.094647	-173.749155	6491	23	4	1199	Lots of fist-sized pieces of tephra falling from plume. Sustained flaming at base of vent.
2009/05/11 13:33:25	-15.094657	-173.749156	6493	23	4	1199	Big rocks raining out of plume
2009/05/11 13:34:55	-15.094643	-173.749165	6496	24	4	1199	Lots of fines raining down around Jason. Larger clasts seem to go around 10m up into plume but fall out of vent fairly close. Probably within a couple of meter of vent.
2009/05/11 13:36:16	-15.094617	-173.749174	6498	23	4	1199	Some of the particles raining down in front of vehicle appear quite red.
2009/05/11 13:36:32	-15.094613	-173.749174	6499	23	4	1199	Flaming at base of vent is increasing again
2009/05/11 13:37:48	-15.094604	-173.749166	6502	23	4	1199	Awesome flaming at vent
2009/05/11 13:38:26	-15.094606	-173.749159	6503	23	4	1199	Smoke from below is getting sucked into flaming part of vent
2009/05/11 13:39:21	-15.094613	-173.749147	6505	23	4	1199	Glow went out but then started back up again. Was out for maybe 10 sec or so. Pulsing is interesting.
2009/05/11 13:39:55	-15.094618	-173.749142	6507	23	4	1199	Some large-ish spatter blocks right around rim of vent.
2009/05/11 13:41:15	-15.094625	-173.749142	6509	23	4	1199	Big explosion
2009/05/11 13:41:42	-15.094625	-173.749145	6510	23	4	1199	Blowing spatter and lots of tephra in plume. Broad view shows big broad pulsing cloud
2009/05/11 13:44:40	-15.094615	-173.749165	6514	23	4	1199	Still watching eruption. Fairly large spatter pieces coming out of plume from pretty high. Dave Clague estimates they are getting at least 10 meters above vent.
2009/05/11 13:45:31	-15.094623	-173.749168	6516	24	4	1199	Lots of rocks raining out of plume.
2009/05/11 13:45:54	-15.094632	-173.749193	6518	99	6	1199	Moving back towards hydrophone.
2009/05/11 13:47:25	-15.094674	-173.749180	6520	152	5	1199	Drips present on underside of shelf of old lava
2009/05/11 13:49:53	-15.094677	-173.749183	6524	155	4	1199	SAMPLE Geology 18. **J418-rock-18**. Breaking off edge of broken pillow rind. Older rock. **[ridge above Hades]**
2009/05/11 13:51:20	-15.094659	-173.749184	6526	154	6	1198	SAMPLE Fluid J418-rock-18 cont. Dropped that rock. Going for another one.
2009/05/11 13:52:02	-15.094644	-173.749189	6528	154	6	1198	J418-rock-18 cont. Breaking off a different pillow rind.
2009/05/11 13:53:50	-15.094628	-173.749196	6531	153	6	1198	J418-rock-18 cont. Dave likes this rock. Looks like the outer rind of a sheet flow if not a large pillow. He is looking for glassy rock and this seems OK.
2009/05/11 13:54:55	-15.094638	-173.749203	6533	154	6	1198	J418-rock-18 cont. Placed in GeoBox#6. Depth=1199m Lat 15 5.678'S Long 173 44.953'W
2009/05/11 13:57:17	-15.094684	-173.749198	6536	154	6	1198	SAMPLE Geology 19. **J418-rock-19**. Rind of a hollow pillow 2-4" inch thick rind. Came from same place as J418-rock-18 but is a different type of rock and probably more glassy than 18. **[ridge above Hades]**
2009/05/11 13:57:53	-15.094687	-173.749194	6538	154	6	1198	J418-rock-19 cont. Placed in GeoBox#6 along with sample J418-rock-18.
2009/05/11 14:01:04	-15.094467	-173.749160	6542	90	13	1198	J418-rock-18 and J418-rock-19 samples are from ridge above Hades but between Hades and the hydrophone. Could see hydrophone marker just off to right in view while sampling.
2009/05/11 14:01:55	-15.094436	-173.749156	6544	92	13	1197	Medea is moving towards Red Rock Ridge.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 14:04:03	-15.094406	-173.749104	6547	120	7	1196	**We are now seeing another vent. NOT Hades and NOT Prometheus. [later named Akel's "Afi" - Tongan word for "fire"]**
2009/05/11 14:07:09	-15.094438	-173.749073	6551	167	8	1197	Position of new vent is Lat 15 5.6668'S 173 44.9428'W Depth=1197m
2009/05/11 14:09:41	-15.094450	-173.749057	6554	172	6	1198	This is a very large vent. A lot like both Hades and Prometheus. It is a large area with smoke coming out from everywhere.
2009/05/11 14:09:58	-15.094448	-173.749058	6556	171	6	1198	SAMPLE Geology This one is flaming too.
2009/05/11 14:10:39	-15.094439	-173.749064	6557	170	6	1197	SAMPLE Geology 20. **J418-rock-20**. Picking up rock from area adjacent to this new vent. Rocks are very fragile. **[Akel's Afi]**
2009/05/11 14:10:55	-15.094437	-173.749066	6559	170	6	1197	J418-rock-20 cont. Placed in GeoBox #7b.
2009/05/11 14:11:50	-15.094423	-173.749051	6561	202	4	1196	J418-rock-20 cont. Lat 15 5.667'S Long 173 44.944'W Depth=1198m
2009/05/11 14:12:49	-15.094432	-173.749036	6563	221	2	1198	This vent is pulsing as well. Was not flaming when we first spotted it but then did so for an extended period before going out.
2009/05/11 14:13:46	-15.094434	-173.749033	6564	221	2	1198	Appears to be blasting out a fair amount of older rock. Rubble around it is about 60% grey (older) and 40% black (new).
2009/05/11 14:14:43	-15.094440	-173.749031	6566	221	2	1198	This vent area is sitting on a steep slope.
2009/05/11 14:17:07	-15.094458	-173.749040	6570	221	1	1198	SAMPLE Geology 21. **J418-sed-21**. Scoop sample of fragmented rock on slope near new vent. Looking to get sample of the mixture of rubble surrounding the vent. Some grey some black rocks. Lots of spatter blocks. **[Akel's Afi]**
2009/05/11 14:18:12	-15.094463	-173.749046	6572	219	1	1198	J418-sed-21 cont. Lat 15 5.668'S Long 173 44.943'W Depth=1199m
2009/05/11 14:19:45	-15.094458	-173.749034	6574	220	2	1198	J418-rock-21 cont. Scoop bag with blue handle (#29). Placing in basket behind Stbd milk crate.
2009/05/11 14:20:37	-15.094459	-173.749028	6576	220	2	1198	Now will take some fluid samples of this vent.
2009/05/11 14:20:56	-15.094457	-173.749023	6578	220	2	1198	Taking HD video of this new vent
2009/05/11 14:21:44	-15.094449	-173.749013	6579	220	2	1198	Flames and tephra at a couple of places within vent.
2009/05/11 14:25:42	-15.094458	-173.749051	6584	220	2	1198	**We're calling this Akel's vent because Akel suspected another source from flying through the plume on other dives. "Akel's Afi" (Tongan for "fire"** - where there's smoke there's fire).
2009/05/11 14:27:07	-15.094464	-173.749062	6587	220	2	1198	Vent was flaming and strongly emitting smoke then suddenly diminished. After about a minute it came back on.
2009/05/11 14:30:57	-15.094421	-173.749039	6592	220	2	1198	Venting has built back up and is now tossing tephra out of plume again.
2009/05/11 14:31:44	-15.094422	-173.749040	6593	220	2	1198	Going for fluid sampler wand now.
2009/05/11 14:35:09	-15.094455	-173.749032	6598	217	2	1197	SAMPLE Fluid 22. J418-HFS-22. Repositioning sub a little to be able to reach plume with less tephra in it.
2009/05/11 14:37:25	-15.094441	-173.749027	6601	218	2	1198	J418-HFS-22 cont. Reaching into plume to right side. One just to the left of this one has flaming at base and lots of tephra jetting into plume.
2009/05/11 14:37:37	-15.094440	-173.749027	6602	218	2	1198	J418-HFS-22 cont. Pump is on.
2009/05/11 14:39:29	-15.094442	-173.749027	6605	218	2	1198	Rocks are really being recycled in vent. Rocks falling back into vent and smoke being sucked back in. Everything being ejected at the same time.
2009/05/11 14:42:10	-15.094450	-173.749020	6609	218	2	1198	J418-HFS-22 cont. Starting now. Filtered Piston#5.
2009/05/11 14:42:45	-15.094452	-173.749016	6610	218	2	1198	Venting is quite vigorous now. Lots of tephra being ejected as well as falling back into vent
2009/05/11 14:42:49	-15.094452	-173.749016	6612	218	2	1198	**J418-HFS-22** cont. Starting now. Filtered Piston#5. **[Akel's Afi]**
2009/05/11 14:44:19	-15.094456	-173.749010	6614	218	2	1198	Flaming at base of plume again
2009/05/11 14:45:12	-15.094456	-173.749014	6616	218	2	1198	J418-HFS-22 cont. Pump keeps starting and stopping. Stopped
2009/05/11 14:45:40	-15.094454	-173.749020	6617	218	2	1198	J418-HFS-22 cont. Tmax=28.4 Tavg=21 T2=7 Vol=approx 100ml
2009/05/11 14:46:44	-15.094444	-173.749034	6619	218	2	1198	SAMPLE Fluid J418-HFS-22 cont. Lat 15 5.668'S Long 173 44.940'W Depth=1199m
2009/05/11 14:47:19	-15.094436	-173.749040	6621	218	2	1198	SAMPLE Fluid 23. **J418-HFS-23**. Piston#6 Unfiltered. Started. **[Akel's Afi]**
2009/05/11 14:49:20	-15.094397	-173.749006	6624	218	2	1198	J418-HFS-23 cont. Stopped.
2009/05/11 14:49:43	-15.094390	-173.748989	6625	218	2	1198	J418-HFS-23 cont. Tmax=26.7 Tavg=23 T2=7 Vol=475ml
2009/05/11 14:50:05	-15.094383	-173.748971	6627	218	2	1198	Sustained flaming
2009/05/11 14:50:48	-15.094369	-173.748933	6629	218	2	1198	SAMPLE Fluid 24. **J418-GTB-24**. Stbd gastight. Fired. **[Akel's Afi]**

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 14:51:31	-15.094355	-173.748896	6630	219	2	1197	J418-gas-24 cont. T1=21 T2=6 Depth=1198m. Same position as fluid samples 22 and 23.
2009/05/11 14:51:44	-15.094350	-173.748886	6631	219	2	1197	About to get blown off position
2009/05/11 14:52:22	-15.094336	-173.748858	6633	222	2	1197	**Venting is sustained and vigorous with flaming and lots of tephra roiling about.**
2009/05/11 14:53:09	-15.094330	-173.748824	6635	219	7	1192	**Time to move. Ship getting blown off position.**
2009/05/11 14:56:48	-15.094660	-173.748498	6640	219	29	1175	Ship is adjusting so it can hold position. Will have to wait until they are ready again.
2009/05/11 14:56:54	-15.094690	-173.748516	6641	219	31	1175	This could take awhile.
2009/05/11 15:14:20	-15.095523	-173.748948	6642	36	115	1174	stopped DV cam. Doppler wander in the nav (cut out postcruise).
2009/05/11 15:33:01	-15.094526	-173.748444	6652	34	21	1178	Ready to get back to business again
2009/05/11 15:33:07	-15.094526	-173.748442	6653	34	19	1180	Heading back to bottom
2009/05/11 15:34:09	-15.094519	-173.748442	6655	35	5	1189	Bottom in sight
2009/05/11 15:34:28	-15.094529	-173.748445	6656	19	8	1190	Starting DV recording again
2009/05/11 15:35:11	-15.094541	-173.748532	6658	31	4	1190	Will now look for Red Rock Ridge again.
2009/05/11 15:36:56	-15.094579	-173.748664	6661	334	7	1189	Fish
2009/05/11 15:37:30	-15.094601	-173.748702	6662	342	5	1189	Fish is probably Zoarcid
2009/05/11 15:40:14	-15.094570	-173.748484	6666	72	6	1187	Lots of volcaniclastic sands blanketing rocks
2009/05/11 15:42:47	-15.094499	-173.748255	6669	59	4	1179	Lots of red-colored rocks and everything is covered with black sands. Not seeing any venting
2009/05/11 15:50:05	-15.094387	-173.748503	6678	93	5	1178	**Found Red Rock Ridge**
2009/05/11 15:52:42	-15.094391	-173.748438	6681	69	5	1178	**DEPLOY** Marker Akel recommends sticking with his target position which is from the navigation from the first night. Lat 15 5.676'S 173 44.915'W. **Marker 9 (octagonal block).**
2009/05/11 15:53:06	-15.094403	-173.748452	6683	74	6	1178	**DEPLOY - Marker 9 is deployed at top of rocks above Red Rock Ridge.**
2009/05/11 15:55:40	-15.094398	-173.748455	6686	96	3	1180	Marker is at depth=1179m. Venting is at Depth=1181m.
2009/05/11 15:56:14	-15.094398	-173.748457	6688	96	3	1180	Venting is coming from between rocks. Stained orange on top and white on undersides.
2009/05/11 15:56:42	-15.094396	-173.748458	6689	95	3	1180	No Shrimp present
2009/05/11 15:59:48	-15.094365	-173.748475	6693	96	3	1180	VIDEO Stop recording HDCam
2009/05/11 16:01:13	-15.094366	-173.748484	6696	96	3	1180	LBL nav currently reads Lat 15 5.663'S Long 173 44.909'W. Akel does not trust this.
2009/05/11 16:02:20	-15.094380	-173.748485	6698	95	3	1180	Positioning Fluid Sampler wand into crack between rocks where white stuff is.
2009/05/11 16:06:10	-15.094420	-173.748445	6703	96	3	1180	SAMPLE Fluid 25. **J418-HFS-25**. **[Red Rock Ridge]** Sampling in weak flow coming from beneath a rock with white staining.
2009/05/11 16:07:30	-15.094407	-173.748453	6705	95	3	1180	J418-HFS-25 cont. Unfiltered Bag #24. Starting now.
2009/05/11 16:10:44	-15.094400	-173.748468	6709	95	3	1180	J418-HFS-25 cont. Stopped
2009/05/11 16:11:45	-15.094402	-173.748461	6711	96	3	1180	J418-HFS-25 cont. Tmax=13.8 Tavg=13.2 Vol=585ml T2=6 Lat 15 5.665'S Long 173 44.907'W. Depth=1181m
2009/05/11 16:19:43	-15.094399	-173.748452	6720	96	3	1180	Adjusting probe to different position.
2009/05/11 16:25:39	-15.094408	-173.748466	6727	95	3	1180	**J418-HFS-26**. Filtered bag #16. Started now. Depth=1181m Alt=2.1 Ambient T=5.0. **[Red Rock Ridge]**
2009/05/11 16:28:11	-15.094387	-173.748459	6731	95	3	1180	J418-HFS-26 cont. Diffuse flow sample from red rock ridge for Butterfield. Lat 15 5.670'S Long 173 44.913'W
2009/05/11 16:28:41	-15.094386	-173.748458	6732	95	3	1180	J418-HFS-26 cont. Stopped
2009/05/11 16:28:59	-15.094387	-173.748457	6734	95	3	1180	J418-HFS-26 cont. Tmax=9.8 Tavg=9.1 Vol=450ml
2009/05/11 16:29:46	-15.094393	-173.748455	6735	95	3	1180	SAMPLE Fluid **J418-HFS-27**. Sterivex filter # 14 started. **[Red Rock Ridge]**
2009/05/11 16:31:12	-15.094410	-173.748453	6738	95	3	1180	J418-HFS-27 cont. Depth=1181m Alt = 2.1 Lat 15 5.670'S Long 173 44.913'W
2009/05/11 16:31:53	-15.094413	-173.748455	6740	95	3	1180	J418-HFS-27 cont. Sterivex filter for Huber from diffuse flow from Red Rock Ridge.
2009/05/11 16:39:28	-15.094391	-173.748423	6748	95	3	1180	J418-HFS-27 cont. Slowly adjusting probe for better temp.
2009/05/11 16:42:28	-15.094391	-173.748462	6752	95	3	1180	J418-HFS-27 cont. Stopped
2009/05/11 16:43:17	-15.094397	-173.748472	6754	95	3	1180	J418-HFS-27 cont. Tmax=14.6 Tavg=8.8 Vol=3050ml
2009/05/11 16:44:02	-15.094403	-173.748475	6756	95	3	1180	Clearing the nozzle then taking pH followed by POC sample for Cowen.
2009/05/11 16:47:24	-15.094408	-173.748460	6760	96	3	1180	Taking pH reading. Waiting for sensor to settle.
2009/05/11 16:47:45	-15.094407	-173.748459	6761	95	3	1180	pH = 6.58

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 16:48:24	-15.094404	-173.748459	6763	95	3	1180	SAMPLE Fluid 28. **J418-HFS-28**. Started. **[Red Rock Ridge]**
2009/05/11 16:49:53	-15.094400	-173.748460	6766	95	3	1180	J418-HFS-28 cont. GFF filter # 20. Organics sample of diffuse flow at Red Rock Ridge for Cowen.
2009/05/11 16:51:06	-15.094401	-173.748460	6768	95	3	1180	J2-418-28 cont. Depth=1180m Alt=2.8 Lat 15 5.670'S Long 173 44.913'W
2009/05/11 17:01:56	-15.094398	-173.748466	6780	95	3	1180	J2-418-28 cont. Stopped
2009/05/11 17:02:52	-15.094400	-173.748463	6782	96	3	1180	J418-HFS-28 cont. Filtered slowed during sampling. Tmax=16.0 Tavg=13.8 Vol=2155ml
2009/05/11 17:03:12	-15.094401	-173.748460	6783	96	3	1180	SAMPLE Fluid 29. **J418-HFS-29**. Unfiltered bag#23. Started. **[Red Rock Ridge]**
2009/05/11 17:04:23	-15.094398	-173.748445	6785	96	3	1180	J418-HFS-29 cont. Unfiltered bag taken at diffuse flow from Red Rock Ridge for Butterfield. Depth=1180m Alt=2.9
2009/05/11 17:06:02	-15.094385	-173.748425	6788	96	3	1180	J418-HFS-29 cont. Stopped. Tmax=15.2 Tavg=13.3 Vol=406ml
2009/05/11 17:06:50	-15.094378	-173.748421	6790	96	3	1180	Storing probe. Moving on and starting search for shrimp.
2009/05/11 17:07:30	-15.094373	-173.748420	6791	95	3	1180	Fine white material in sand disturbed by probe.
2009/05/11 17:11:25	-15.094368	-173.748449	6796	1	3	1182	Moving on and attempting to find scoop tube (Davis sampler) that fell off porch yesterday and look for shrimp.
2009/05/11 17:11:44	-15.094374	-173.748484	6797	2	3	1184	Moving north heading 001.5
2009/05/11 17:12:19	-15.094380	-173.748546	6799	2	2	1187	Bottom covered with sediment a few rock outcrops seen.
2009/05/11 17:13:30	-15.094355	-173.748557	6801	76	4	1188	Moving along bathy where scoop was lost. Moving along steep cliff.
2009/05/11 17:15:03	-15.094356	-173.748559	6804	131	3	1186	At Epsilon - a small rock outcrop with some venting. Searching for shrimp
2009/05/11 17:15:08	-15.094354	-173.748559	6805	127	4	1185	VIDEO Start recording HDCam
2009/05/11 17:16:08	-15.094343	-173.748563	6807	128	5	1185	Small rock outcrop with lots of volcaniclastic seds on it. Some hydrothermal staining with white and red bacterial mat.
2009/05/11 17:16:22	-15.094339	-173.748561	6808	128	5	1185	No fauna seen.
2009/05/11 17:19:11	-15.094311	-173.748499	6812	128	5	1185	**DEPLOY Marker 147. Location Epsilon (??)**Lat 15 5.6717'S Long 173 44.9146'W Depth=1185m Alt=4.9
2009/05/11 17:20:44	-15.094307	-173.748518	6814	85	5	1184	Continuing search for shrimp. Debating where to go.
2009/05/11 17:22:00	-15.094376	-173.748449	6817	70	3	1181	Moving to Shrimp City. Sediment stirred by Jason in view in water column. Heading=080.6
2009/05/11 17:22:44	-15.094380	-173.748432	6818	48	4	1178	Red Rock Rdge in view. Marker 9 in view on top of red stained rock out crop.
2009/05/11 17:22:50	-15.094378	-173.748432	6820	49	4	1178	***NAV Doppler reset***
2009/05/11 17:23:44	-15.094346	-173.748386	6821	47	5	1175	Moving toward Shrimp City. On a ridge covered with sediment and red colored pillowed outcrops.
2009/05/11 17:24:15	-15.094327	-173.748360	6823	51	6	1173	Surface of sand is dark. Some white staining found under pillows.
2009/05/11 17:24:58	-15.094302	-173.748349	6825	62	6	1170	Larger white shaggy mat in view located on large pillow.
2009/05/11 17:25:18	-15.094298	-173.748347	6826	61	8	1169	Lots of diffuse flow evident.
2009/05/11 17:25:56	-15.094277	-173.748320	6828	61	7	1166	Lots of clear shimmering fluids present. Large white mats.
2009/05/11 17:27:13	-15.094265	-173.748214	6830	55	2	1163	Moving along sediment covered sharp ridge with some Fe oxide staining.
2009/05/11 17:28:16	-15.094189	-173.748102	6832	70	5	1164	Sediment covered bottom with **Prometheus directly ahead making large plume into water.**
2009/05/11 17:28:47	-15.094163	-173.748103	6833	110	12	1167	Prometheus plume in view. A large robust thick plume.
2009/05/11 17:29:29	-15.094156	-173.748128	6835	112	5	1171	Moving to left of plume down large wall with plume rising to port.
2009/05/11 17:29:46	-15.094147	-173.748133	6836	75	4	1171	Biology - Shrimp (about 50)
2009/05/11 17:30:17	-15.094097	-173.748140	6838	97	14	1173	Moving to other side of the vent for shrimp search.
2009/05/11 17:30:44	-15.094077	-173.748137	6839	96	9	1178	Prometheus in view relatively calm when compared to yesterday.
2009/05/11 17:31:33	-15.094036	-173.748083	6841	117	6	1178	Search wall north of Prometheus. Biology -- few shrimp (about 10 seen)
2009/05/11 17:32:32	-15.094031	-173.748028	6843	123	5	1176	Spattered rock. Bright white staining on black rock. Shrimp found. Lots of shrimp.
2009/05/11 17:34:02	-15.094044	-173.748028	6846	124	5	1175	Lots of shrimp found around a small hole. **This could be Shrimp City**. There are hundreds of shrimp.
2009/05/11 17:36:47	-15.094056	-173.748000	6849	123	5	1175	SAMPLE Biology 30. **J418-shrimp-30**. Suction sample of shrimp for Podowski. Depth=1175m Alt = 5.2 Lat 15 5.642'S Long 173 44.886'W **[Shrimp City Area]**
2009/05/11 17:38:21	-15.094054	-173.748005	6852	122	5	1175	J418-shrimp-30 cont. Lots of shrimp were just taken. Estimate more than 50 but less than 500. Shrimp also working a large white patch.

time stamp	vv lat	vv long	vvrec	hdg	alt	jasZ	J418 log comment (West Mata)
2009/05/11 17:39:49	-15.094058	-173.748017	6854	122	6	1175	J418-shrimp-30 cont. Went into single slurp chamber. Taking temperature in white mat.
2009/05/11 17:40:49	-15.094061	-173.748023	6856	122	6	1175	J418-shrimp-30 cont. Some flow evident. Temp=9.9
2009/05/11 17:42:45	-15.094059	-173.748018	6859	122	6	1175	J418-shrimp-30 cont. Moved temp probe for another temp reading. Temp=21.5
2009/05/11 17:44:44	-15.094057	-173.748014	6862	122	6	1175	J418-shrimp-30 cont. Moving temp probe right out of white mat. Temp=7.3
2009/05/11 17:46:31	-15.094061	-173.748027	6865	122	5	1175	J418-shrimp-30 cont. Taking another temp probe inserted into small crack. Temp=20.7
2009/05/11 17:46:58	-15.094063	-173.748029	6867	122	5	1175	Debating about taking a water sample from diffuse flow originating from fissure.
2009/05/11 17:47:52	-15.094066	-173.748030	6869	122	5	1175	Taking a HFS sample.
2009/05/11 17:53:36	-15.094060	-173.748009	6875	121	5	1175	Taking a pH reading. Probe inserted into crack just right of white mat where shrimp were sampled.
2009/05/11 17:54:17	-15.094057	-173.748013	6877	121	5	1175	Temp on HFS sampler is around 18. pH=6.65
2009/05/11 17:54:33	-15.094056	-173.748014	6878	121	5	1175	SAMPLE Fluid 31. **J418-HFS-31**. Jason is located several meters above Shrimp City. Started. Depth=1176m Alt=4.5 Lat 15 5.642'S Long 173 44.886'W. Ambient T=5.2 **[Shrimp City Area]**
2009/05/11 17:55:54	-15.094051	-173.748018	6881	121	5	1175	J418-HFS-31 cont. Unfiltered bag #22 for Butterfield. Diffuse flow at location with hundreds of shrimp.
2009/05/11 17:57:06	-15.094049	-173.748018	6883	121	5	1175	J418-HFS-31 cont. Stopped. Tmax=19.3 Tavg=18.9 Vol=403ml
2009/05/11 17:57:24	-15.094049	-173.748018	6884	121	5	1175	VIDEO Stop recording HDCam
2009/05/11 17:57:50	-15.094049	-173.748018	6886	121	5	1175	SAMPLE Fluid 32. **J418-HFS-32**. Started. Filtered bag #17. **[Shrimp City Area]**
2009/05/11 17:58:56	-15.094051	-173.748017	6888	121	5	1175	J418-HFS-32 cont. Sample of diffuse flow at location above Shrimp City for Butterfield. Depth=1176m Alt 4.6
2009/05/11 18:00:16	-15.094055	-173.748015	6890	121	5	1175	J418-HFS-32 cont. Stopped. Lat 15 5.642'S Long 173 44.886'W Tmax=18.8 Tavg=18.1 Vol=412ml
2009/05/11 18:00:29						1175	Dive completed.
2009/05/11 18:02:30						1175	Securing Jason for recovery.
2009/05/11 18:05:25						1156	JASON off bottom
2009/05/11 18:37:47						100	Butterfield reports an error in HFS sampling. Bag 23 was sampled twice. Once at Red Rock Ridge and another time at the final shrimp site. Bag is likely busted.
2009/05/11 18:52:05						2	Medea on deck.
2009/05/11 18:55:57						1	JASON on deck
2009/05/11 18:56:07						1	End of Dive J2-418

J2-419 Dive Aborted

J2-420 Dive Log

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 09:41:15					199	2	JASON in water
2009/05/12 09:41:33					193	2	Trying this again.
2009/05/12 09:44:02					179	2	Medea in the water.
2009/05/12 10:49:03	-15.103371	-173.755723	6928	2	12	1849	Jason on bottom. **S of rift zone and SW of summit.**
2009/05/12 10:50:32	-15.103342	-173.755726	6930	3	7	1850	Looking for a rock.
2009/05/12 10:50:43	-15.103345	-173.755728	6931	2	8	1849	Sedimented bottom.
2009/05/12 10:51:52	-15.103328	-173.755743	6933	3	7	1849	Seeing small rocks and fine grain sediment.
2009/05/12 10:52:09	-15.103352	-173.755753	6935	3	9	1848	One medium pillow.
2009/05/12 10:52:23	-15.103364	-173.755759	6936	3	10	1848	Jason checking weight.
2009/05/12 10:52:50	-15.103380	-173.755769	6937	3	11	1848	Looks like a sedimented slope.
2009/05/12 10:54:07	-15.103338	-173.755780	6940	3	13	1844	Ready to move up slope.
2009/05/12 10:54:31	-15.103296	-173.755768	6941	2	10	1844	We are going to move up slope and look for a rock outcrop.
2009/05/12 10:54:52	-15.103333	-173.755731	6942	3	11	1844	Seeing a white rock.
2009/05/12 10:55:15	-15.103266	-173.755711	6944	4	10	1842	Going to look at the white rock outcrop.
2009/05/12 10:55:29	-15.103246	-173.755709	6945	3	8	1843	Rock looks stained white.
2009/05/12 10:55:56	-15.103239	-173.755703	6946	3	9	1843	Lots of white staining on the rock.
2009/05/12 10:56:09	-15.103236	-173.755699	6948	4	9	1842	Unsure if it is in place.
2009/05/12 10:56:42	-15.103224	-173.755686	6949	4	9	1843	We are going to move up slope.
2009/05/12 10:57:26	-15.103205	-173.755675	6951	5	9	1843	Heading north.
2009/05/12 10:58:18	-15.103191	-173.755668	6953	5	12	1840	HD cam is down.
2009/05/12 10:58:55	-15.103180	-173.755665	6954	5	11	1840	The box may have overheated.
2009/05/12 10:59:41	-15.103194	-173.755670	6956	5	11	1840	Pilot change Will H. is taking over.
2009/05/12 11:00:22	-15.103187	-173.755675	6958	3	11	1839	Now heading up slope to the north.
2009/05/12 11:00:38	-15.103180	-173.755676	6959	5	10	1839	Still looking at the large stained outcrop.
2009/05/12 11:01:15	-15.103147	-173.755674	6961	8	5	1837	We are hoping to find where the rock came from.
2009/05/12 11:01:51	-15.103135	-173.755679	6962	4	6	1835	Still trying to fix the HD camera.
2009/05/12 11:02:13	-15.103126	-173.755684	6964	5	6	1835	Seeing lots of sediment.
2009/05/12 11:03:29	-15.103013	-173.755689	6966	4	6	1827	Deep sea shrimp.
2009/05/12 11:03:37	-15.103005	-173.755690	6967	4	7	1826	Slab outcrop.
2009/05/12 11:03:48	-15.102978	-173.755689	6968	5	7	1824	Some white staining on the slab.
2009/05/12 11:04:08	-15.102952	-173.755686	6970	3	8	1822	Sheet flow?
2009/05/12 11:05:11	-15.102950	-173.755667	6972	13	8	1819	Looks like an eruptive pillow.
2009/05/12 11:05:49	-15.102931	-173.755682	6973	26	8	1818	Some yellow staining on the rock.
2009/05/12 11:06:17	-15.102926	-173.755676	6975	28	7	1818	Looks like an older rock.
2009/05/12 11:06:34	-15.102929	-173.755677	6976	31	7	1818	Going to sample a rock
2009/05/12 11:06:56	-15.102933	-173.755677	6977	36	7	1818	We are going to break off a piece of the outcrop.
2009/05/12 11:07:07	-15.102937	-173.755678	6979	42	9	1817	Got a rock.
2009/05/12 11:09:25	-15.102776	-173.755626	6982	347	19	1795	SAMPLE Geology 1. **J420-rock-01**. Pillow fragment with lots of staining. Z=1812. 15 6.170 173 45.337. **[Near our landing site- SW flank]**
2009/05/12 11:09:36	-15.102774	-173.755623	6983	359	22	1792	Moving up slope now.
2009/05/12 11:12:30	-15.102371	-173.755588	6987	359	6	1788	We are finding lots of broken pillows and fragments.
2009/05/12 11:13:36	-15.102345	-173.755592	6989	359	5	1788	Still seeing lots of sediments and rock fragments.
2009/05/12 11:14:40	-15.102338	-173.755584	6991	357	4	1788	Seeing lots of sediments.
2009/05/12 11:14:51	-15.102346	-173.755582	6992	359	4	1788	Some white staining on a rock.
2009/05/12 11:16:58	-15.102389	-173.755569	6995	359	10	1779	Looks more rubbery.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 11:17:48	-15.102360	-173.755570	6997	1	13	1771	Still seeing sediments with some outcrops.
2009/05/12 11:18:12	-15.102310	-173.755566	6999	0	8	1768	Sediments on top of an outcrop.
2009/05/12 11:18:30	-15.102275	-173.755567	7000	359	4	1768	These outcrops look old.
2009/05/12 11:19:24	-15.102192	-173.755568	7002	359	4	1767	Looks more rubbery.
2009/05/12 11:20:32	-15.102117	-173.755578	7004	0	4	1763	Going up the slope.
2009/05/12 11:21:37	-15.102076	-173.755587	7006	359	4	1761	Large deep-sea shrimp.
2009/05/12 11:22:37	-15.101997	-173.755578	7008	359	4	1757	Low outcrops with lots of sediment.
2009/05/12 11:23:52	-15.101965	-173.755563	7010	358	5	1753	White staining on rocks.
2009/05/12 11:24:20	-15.101929	-173.755562	7012	359	4	1751	Sonar shows more outcrops ahead.
2009/05/12 11:25:21	-15.101910	-173.755552	7014	359	7	1746	Large outcrop ahead.
2009/05/12 11:25:35	-15.101911	-173.755551	7015	359	7	1745	Sheet-like flow.
2009/05/12 11:26:50	-15.101901	-173.755558	7017	343	6	1744	We are going to sample a rock from here.
2009/05/12 11:27:17	-15.101907	-173.755561	7019	342	6	1744	Breaking a rock off of the outcrop.
2009/05/12 11:30:13	-15.101886	-173.755589	7023	101	2	1744	We are going to reposition to get a grip on the outcrop.
2009/05/12 11:33:10	-15.101868	-173.755610	7027	60	5	1744	We have a rock but it might be too big.
2009/05/12 11:35:52	-15.101929	-173.755604	7030	25	14	1738	SAMPLE Geology 2. Geology 2. **J420-rock-02** large stained rock broken from sheet flow. Placed in geobox 4 15 6.113 173 45.336 Z=1739 **[moving upslope - SW flank+H75]**
2009/05/12 11:36:06	-15.101937	-173.755605	7032	25	14	1738	We are going to take a scoop now.
2009/05/12 11:37:05	-15.101843	-173.755588	7034	20	15	1728	Moving up slope above the outcrop for a scoop.
2009/05/12 11:38:17	-15.101707	-173.755573	7036	17	8	1717	Lots of rubble here.
2009/05/12 11:38:29	-15.101699	-173.755573	7037	7	5	1717	Found a nice place for a scoop.
2009/05/12 11:40:15	-15.101625	-173.755560	7040	297	3	1719	Landing so we can take a scoop.
2009/05/12 11:43:03	-15.101599	-173.755551	7044	293	5	1719	SAMPLE Geology 3. **J420-sed-03**. Fine sediments in scoop 23. Taken upslope from rock-02. Z=1720 15 6.095 173 45.333. Stowed behind port geo crate. **[moving upslope - SW flank]**
2009/05/12 11:43:51	-15.101600	-173.755555	7045	304	4	1719	Now we're are going to move upslope.
2009/05/12 11:44:30	-15.101613	-173.755564	7047	2	5	1715	Sediment is very fine grained. Easy to make small slides with Jason.
2009/05/12 11:45:20	-15.101580	-173.755568	7049	4	6	1714	Haven't seen any biology attached to the rocks.
2009/05/12 11:45:43	-15.101569	-173.755570	7050	4	7	1712	White staining.
2009/05/12 11:46:29	-15.101548	-173.755568	7052	4	7	1712	Outcrop with pillows on the top.
2009/05/12 11:46:55	-15.101547	-173.755567	7053	4	7	1712	HD is down and probably won't be back up.
2009/05/12 11:48:12	-15.101546	-173.755562	7056	4	7	1712	We are going to shut the HD down for .5 hours to see if that fixes it.
2009/05/12 11:50:25	-15.101535	-173.755600	7059	4	3	1708	Still seeing lots of rubble and sediments.
2009/05/12 11:50:38	-15.101521	-173.755603	7060	4	2	1708	Pillow structures here.
2009/05/12 11:53:34	-15.101323	-173.755628	7064	4	5	1699	Long draping pillows.
2009/05/12 11:53:45	-15.101314	-173.755626	7065	0	5	1699	Not a lot of sand on the pillows here.
2009/05/12 11:54:14	-15.101296	-173.755625	7067	318	6	1700	Going to try to break off a piece of one of these pillows.
2009/05/12 11:57:59	-15.101304	-173.755638	7071	354	11	1689	The pillows are too tough. Leaving only claw marks on them. Will try to sample later.
2009/05/12 11:58:30	-15.101201	-173.755631	7073	2	5	1685	Continuing upslope. Outcrop is all elongate pillows. At top is sand.
2009/05/12 11:58:46	-15.101161	-173.755623	7074	2	5	1685	Still some pillows sticking out of sand.
2009/05/12 11:59:18	-15.101104	-173.755623	7076	1	6	1682	Tunifore just floated by.
2009/05/12 11:59:30	-15.101089	-173.755626	7077	0	6	1681	White staining on rocks.
2009/05/12 11:59:45	-15.101082	-173.755631	7078	0	6	1680	Lavas are more rubbly looking.
2009/05/12 12:00:00	-15.101079	-173.755637	7079	1	5	1681	Look like submarine a' a' flows.
2009/05/12 12:00:57	-15.101053	-173.755637	7081	1	5	1679	We are traveling up the slope on the S side of the ridge. But are SW of the erupting vents.
2009/05/12 12:01:19	-15.101023	-173.755633	7083	1	4	1677	Jason is currently at Depth=1678m
2009/05/12 12:01:53	-15.100987	-173.755629	7084	1	5	1675	Pillows were young enough to not have sand covering them. This flow has lots of sand on it.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 12:02:31	-15.100946	-173.755620	7086	1	6	1673	Big bulbous pillows with sand on top.
2009/05/12 12:02:40	-15.100926	-173.755616	7087	1	5	1672	Sand has ripples in it.
2009/05/12 12:03:08	-15.100913	-173.755614	7089	1	5	1669	More elongate pillows on the right.
2009/05/12 12:03:44	-15.100903	-173.755612	7090	1	5	1667	Smooth flows on the left.
2009/05/12 12:03:51	-15.100902	-173.755612	7091	1	6	1666	More brecciated flows on the right.
2009/05/12 12:04:48	-15.100896	-173.755611	7093	16	4	1665	Thinking of taking a sample from a pillow that looks like it has a small collapse pit in it.
2009/05/12 12:06:07	-15.100907	-173.755623	7096	15	4	1665	SAMPLE Geology 4. **J420-rock-04**. Broke off a piece of a pillow. Very glassy. Fairly small piece. **[moving upslope - SW flank]**
2009/05/12 12:07:07	-15.100953	-173.755651	7098	15	6	1665	J420-rock-04 cont. We are part way up slope to ridge crest. Depth=1666m
2009/05/12 12:08:33	-15.100822	-173.755666	7100	17	8	1656	J420-rock-04 cont. Sample placed in GeoBox#7a. Lat 15 6.056'S Long 173 45.339'W Depth=1666m.
2009/05/12 12:08:56	-15.100815	-173.755680	7101	17	8	1656	Combination of breadcrusted pillows and smooth pillows.
2009/05/12 12:10:32	-15.100687	-173.755680	7104	16	7	1649	Back over talus and debris. Probably from this flow as it extruded above and broke off.
2009/05/12 12:12:01	-15.100600	-173.755656	7106	359	8	1643	Some pillows are not in place here either. Talus field as graded sizes from large pillows on left of view to broken pillows to small pieces.
2009/05/12 12:12:22	-15.100595	-173.755654	7108	1	8	1642	Combination of in-place pillows and pillow talus that had come downslope.
2009/05/12 12:13:04	-15.100581	-173.755649	7109	2	9	1639	A couple of white dots (animals?) on the rocks.
2009/05/12 12:13:43	-15.100589	-173.755652	7111	2	9	1637	Elongate pillows. Talus in between. Channel broke out of one pillow and flow more like a sheet.
2009/05/12 12:14:58	-15.100574	-173.755661	7113	360	11	1633	As we approach the crest there is more and more sand.
2009/05/12 12:15:18	-15.100548	-173.755665	7115	2	8	1633	More white staining on some of the rocks.
2009/05/12 12:15:25	-15.100549	-173.755666	7116	2	7	1632	Some texture to pillows - rippling.
2009/05/12 12:15:55	-15.100553	-173.755673	7117	1	6	1632	White staining appears to be more mineral precipitate rather than bacterial mat.
2009/05/12 12:16:11	-15.100552	-173.755676	7119	1	6	1631	Ripple marks in sand imply currents can get pretty strong.
2009/05/12 12:17:50	-15.100459	-173.755696	7121	2	6	1623	Back in talus with some in-place pillows but most is loose debris. Sand to the right of the view.
2009/05/12 12:17:56	-15.100453	-173.755698	7122	1	6	1622	Very steep.
2009/05/12 12:18:43	-15.100396	-173.755709	7124	1	7	1618	We are almost to the crest. Will then travel NE up the crest towards the summit.
2009/05/12 12:18:51	-15.100381	-173.755710	7125	2	6	1618	Talus slope as we approach the crest.
2009/05/12 12:21:25	-15.100199	-173.755747	7129	2	3	1610	Talus and sand.
2009/05/12 12:21:49	-15.100168	-173.755749	7130	1	3	1610	Continues as mixture of sand and mostly angular debris.
2009/05/12 12:21:55	-15.100164	-173.755748	7131	1	3	1609	Small outcrop of pillows.
2009/05/12 12:22:28	-15.100145	-173.755739	7133	2	3	1609	White staining on some rocks. Not much alive if anything.
2009/05/12 12:23:08	-15.100164	-173.755749	7135	2	4	1608	We are not too far from crest of ridge now.
2009/05/12 12:23:31	-15.100179	-173.755752	7136	2	4	1608	Rubble on left of view. Sand on slope on right.
2009/05/12 12:24:28	-15.100206	-173.755711	7138	352	5	1607	Some finer material looks very dark. Possibly spatter.
2009/05/12 12:24:49	-15.100193	-173.755702	7139	353	8	1603	Pillow fragments.
2009/05/12 12:24:59	-15.100170	-173.755699	7140	354	8	1601	Small cliff ahead.
2009/05/12 12:25:22	-15.100111	-173.755689	7142	352	8	1597	Seeing more pillows.
2009/05/12 12:25:26	-15.100099	-173.755685	7143	352	8	1597	Some are broken off.
2009/05/12 12:26:03	-15.100050	-173.755667	7144	356	8	1591	Depth=1593 Heading=356
2009/05/12 12:26:30	-15.099996	-173.755636	7146	359	6	1589	Steep slope mostly sand with talus and pillow fragments scattered about.
2009/05/12 12:26:49	-15.099960	-173.755621	7147	358	5	1588	The occasional shrimp is floating by.
2009/05/12 12:27:08	-15.099946	-173.755610	7149	359	7	1585	Cliff is an outcrop of pillows.
2009/05/12 12:27:48	-15.099907	-173.755617	7150	25	9	1582	Dave would like a sample from a hollow pillow with broken end.
2009/05/12 12:29:59	-15.099831	-173.755649	7153	8	25	1564	Lava tubes draped over cliff. Terminus of pillows hanging in mid-air.
2009/05/12 12:30:46	-15.099818	-173.755660	7155	8	6	1562	Want a sample before we change direction to go up along the ridge.
2009/05/12 12:31:41	-15.099813	-173.755669	7157	14	3	1563	Looks like an old flow. Lots of sand on top if pillows.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 12:32:52	-15.099814	-173.755682	7159	11	3	1563	SAMPLE Geology 5. **J420-rock-05**. Breaking off piece from outside of pillow. Rock is very crumbly. **[crest of SW ridge]**
2009/05/12 12:33:52	-15.099816	-173.755693	7161	11	9	1559	J420-rock-05 cont. Have a piece of flat rind off pillow about an inch thick. It is fragile and glass.
2009/05/12 12:34:34	-15.099814	-173.755701	7163	10	12	1556	J420-rock-05 cont. Want it on top because if something lands on it will crunch to bits.
2009/05/12 12:35:45	-15.099769	-173.755730	7165	11	7	1556	J420-rock-05 cont. This is from right at ridge crest where we are turning NE to travel along the ridge. Depth=1560m Lat 15 5 988;S 173 43..343
2009/05/12 12:36:23	-15.099777	-173.755712	7167	15	4	1558	J420-rock-05 cont. Placed into GeoBox#4 on top of sample J420-rock-02
2009/05/12 12:36:38	-15.099780	-173.755712	7168	14	4	1558	Ripples in sediment around pillows.
2009/05/12 12:37:52	-15.099769	-173.755706	7170	15	1	1560	SAMPLE Geology 6. **J420-sed-06**. Taking a scoop sample from a big pile of sand not far from rock-05. **[crest of SW ridge]**
2009/05/12 12:38:15	-15.099767	-173.755706	7172	16	2	1560	J420-sed-06 cont. Getting blue scoop from front of basket.
2009/05/12 12:39:27	-15.099764	-173.755701	7174	16	1	1560	J420-sed-06 cont. Pile of sand has a large pillow draped across the top. Looks like the pillow may have been extruded on top of sand because at its terminus where it draped over sand pile the sand has been scoured away leaving the pillow terminus hanging in mid air.
2009/05/12 12:40:02	-15.099765	-173.755696	7175	16	2	1560	J420-sed-06 cont. Surface of sand pile is rippled.
2009/05/12 12:41:12	-15.099762	-173.755689	7178	16	2	1560	J420-sed-06 cont. Did not get blue handle scoop. Have green bag scoop in hand.
2009/05/12 12:41:56	-15.099759	-173.755686	7179	16	2	1560	J420-rsed-06 cont. Depth=1561m Lat 15 5.986'S 173 43.341'W
2009/05/12 12:44:28	-15.099760	-173.755691	7183	16	2	1560	J420-sed-06 cont. Dragging bag through pile of sand. Bag is about 1/4 full. That's enough sample. Placing green scoop bag behind geoboxes.
2009/05/12 12:47:27	-15.099716	-173.755707	7187	56	6	1555	We are changing direction and heading to NE.
2009/05/12 12:48:01	-15.099671	-173.755651	7188	57	4	1553	Mostly pillows here.
2009/05/12 12:48:17	-15.099665	-173.755621	7190	56	5	1553	Flying over a talus pile.
2009/05/12 12:48:28	-15.099663	-173.755602	7191	57	4	1552	Lots of broken pillows.
2009/05/12 12:49:30	-15.099604	-173.755489	7193	58	6	1543	Sand flow streaming down through larger talus.
2009/05/12 12:50:21	-15.099656	-173.755449	7195	90	12	1536	In-place pile of pillows.
2009/05/12 12:51:17	-15.099766	-173.755375	7197	57	12	1536	Breadcrust pillows.
2009/05/12 12:51:33	-15.099747	-173.755365	7198	52	13	1534	These pillows are not dusted with too much sand.
2009/05/12 12:52:00	-15.099733	-173.755359	7199	54	10	1535	Dave just spotted the broken end of a pillow he wants to sample.
2009/05/12 12:52:07	-15.099733	-173.755353	7201	55	9	1535	Moving in to take a sample.
2009/05/12 12:53:34	-15.099747	-173.755345	7203	59	7	1537	SAMPLE Geology 7. **J420-rock-07**. Rind of a pillow from the crest of W Mata. Depth=1538m Lat 15 5.986'S 173 45.430'W **[SW ridge crest]**
2009/05/12 12:54:54	-15.099769	-173.755357	7205	58	6	1537	J420-rock-07 cont. Breaking rind of broken end of collapsed pillow. Very crumbly. Breaks off easily but pieces are very small and slip through claws.
2009/05/12 12:56:53	-15.099747	-173.755444	7208	56	16	1535	J420-rock-07 cont. Taking a piece that fell down into collapse area. May actually be several smaller pieces. Placing into GeoBox#7b.
2009/05/12 12:58:01	-15.099676	-173.755374	7210	56	15	1528	Elongate pillows draped down steep (almost vertical) face of slope.
2009/05/12 12:58:40	-15.099652	-173.755366	7212	56	7	1523	Not many with collapse features.
2009/05/12 12:59:50	-15.099589	-173.755304	7214	57	7	1518	Patches where there is a lot of sand on top of and between pillows.
2009/05/12 13:00:15	-15.099545	-173.755267	7216	56	6	1516	Pillows are getting larger.
2009/05/12 13:01:06	-15.099496	-173.755186	7218	56	4	1515	Some pillows show broken ends and drain-out.
2009/05/12 13:01:32	-15.099471	-173.755139	7219	57	4	1514	Scouring of sand around pillows. Also see ripples in sand.
2009/05/12 13:01:40	-15.099472	-173.755125	7220	56	3	1514	Have not seen any sessile animals.
2009/05/12 13:02:43	-15.099429	-173.755069	7222	56	4	1512	Pillows with sand.
2009/05/12 13:04:04	-15.099393	-173.754970	7224	56	2	1514	Slope is more gentle.
2009/05/12 13:04:12	-15.099382	-173.754950	7226	56	3	1515	Pillows are more bulbous.
2009/05/12 13:04:44	-15.099351	-173.754899	7227	56	3	1516	Some pillows have breadcrust texture.
2009/05/12 13:06:55	-15.099295	-173.754812	7230	56	2	1517	Each of these pillows has a mound of sand on top.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 13:07:37	-15.099267	-173.754802	7232	56	1	1518	There is a white patch. Want to see if it is bacterial or not. An animal is also on the rocks.
2009/05/12 13:08:10	-15.099260	-173.754818	7234	57	2	1517	White patch looks mineral. Animal is a fish hovering over rock. Still no sessile animals.
2009/05/12 13:09:51	-15.099244	-173.754749	7236	57	4	1515	Large pillows covered in sand.
2009/05/12 13:11:24	-15.099198	-173.754678	7239	55	1	1516	Sand is draping over surfaces of pillows giving them a very odd texture/look.
2009/05/12 13:12:01	-15.099168	-173.754673	7240	88	2	1515	Large pillow cracked apart. Exploded apart.
2009/05/12 13:12:48	-15.099154	-173.754656	7242	230	2	1515	SAMPLE Geology 8. **J420-rock-08**. Taking a sample from the exploded pillow. **[SW ridge crest]**
2009/05/12 13:13:41	-15.099155	-173.754652	7244	240	1	1516	J420-rock-08 cont. Depth=1517m Lat 15 5.950'S Long 173 45.279'W
2009/05/12 13:14:32	-15.099156	-173.754648	7246	234	2	1515	J420-rock-08 cont. Picked up a piece that broke off the edge of the hollow pillow. Has glass rind on one side. Placing in GeoBox#8b
2009/05/12 13:16:07	-15.099142	-173.754642	7249	59	5	1512	Watch change: Akel at Nav. Jim Varnum pilot.
2009/05/12 13:17:13	-15.099145	-173.754638	7251	59	4	1513	Everyone getting settled in.
2009/05/12 13:19:35	-15.099130	-173.754606	7254	59	2	1513	Moving along ridge crest to NE again.
2009/05/12 13:19:45	-15.099122	-173.754594	7255	59	3	1513	Jellyfish just floated by.
2009/05/12 13:20:48	-15.099094	-173.754573	7257	60	2	1514	Breadcrust pillow with the crust is quite thick.
2009/05/12 13:22:19	-15.099028	-173.754455	7260	33	4	1514	Dave Caress just brought in map from AUV and it is remarkable.
2009/05/12 13:22:38	-15.099004	-173.754436	7261	33	4	1512	Steep slope stepping up ridge.
2009/05/12 13:23:08	-15.099003	-173.754427	7263	33	7	1510	Truncate pillows stacked like firewood.
2009/05/12 13:24:35	-15.098957	-173.754383	7265	45	13	1505	We are going up a terrace scarp.
2009/05/12 13:28:32	-15.098938	-173.754390	7270	44	4	1504	Still in pillow terrain. Still with lots of sand on top of the pillows.
2009/05/12 13:30:23	-15.098886	-173.754321	7273	44	4	1503	Slight white staining in cracks of one pillow.
2009/05/12 13:30:47	-15.098874	-173.754307	7274	45	3	1503	Drainout from a large pillow.
2009/05/12 13:32:47	-15.098748	-173.754200	7277	45	4	1501	Big lumpy pillows.
2009/05/12 13:33:22	-15.098670	-173.754171	7279	43	1	1503	Want sample from edge of collapsed pillow.
2009/05/12 13:34:48	-15.098640	-173.754182	7281	44	1	1503	SAMPLE Geology 9. **J420-rock-09**. Breaking off edge of collapsed pillow. Lat 15 5.917'S 173 45.251'W Depth=1505m **[SW ridge crest]**
2009/05/12 13:35:39	-15.098630	-173.754189	7283	44	1	1503	J420-rock-09 cont. Nice drips on bottom side. This is a keeper. Putting sample in GeoBox#3
2009/05/12 13:36:30	-15.098608	-173.754176	7285	45	2	1503	J420-rock-09 cont. This rock is from a big hollow pillow on the ridge crest. Pillow is about 1 to 1.5 meters across.
2009/05/12 13:37:03	-15.098633	-173.754120	7286	55	3	1504	Can see ripples in sand between pillows.
2009/05/12 13:37:41	-15.098640	-173.754048	7288	54	3	1506	Still no sessile animals anywhere.
2009/05/12 13:38:14	-15.098629	-173.753985	7290	55	3	1506	Some white staining on edges where pillows cracked.
2009/05/12 13:39:09	-15.098615	-173.753887	7292	54	3	1506	Sediments seem to be getting thicker sometimes completely covering pillows. Sediments are dark sand.
2009/05/12 13:39:55	-15.098606	-173.753815	7293	55	3	1506	Rubble. Probably the base of the next rise.
2009/05/12 13:41:23	-15.098563	-173.753721	7296	55	6	1499	This is quite a talus slope!
2009/05/12 13:42:35	-15.098539	-173.753665	7298	71	7	1493	Jason was at Depth=1505 when started up this steep rise. Now at Depth=1495 and not at top yet.
2009/05/12 13:43:21	-15.098499	-173.753632	7300	68	11	1487	Seeing little things growing on the rocks now. Possibly small hydroids?
2009/05/12 13:43:39	-15.098482	-173.753613	7301	68	8	1486	Pillows are more elongate now. Rattail fish.
2009/05/12 13:44:01	-15.098463	-173.753608	7302	56	4	1485	Pillows and lobate flows.
2009/05/12 13:44:06	-15.098456	-173.753602	7304	55	4	1485	Sand on top of rocks.
2009/05/12 13:44:39	-15.098425	-173.753578	7305	57	3	1483	Quite a few animals. Looks like a stalked sponge.
2009/05/12 13:45:06	-15.098412	-173.753568	7308	57	3	1483	Look like lollipops.
2009/05/12 13:45:24	-15.098398	-173.753547	7309	57	3	1482	Does not appear to be any venting around here.
2009/05/12 13:46:17	-15.098369	-173.753524	7311	5	2	1482	Bright red animal.
2009/05/12 13:47:09	-15.098381	-173.753547	7313	4	2	1482	Trying to take a piece of a broken pillow.
2009/05/12 13:48:40	-15.098377	-173.753547	7315	53	3	1479	NO SAMPLE. Ship is getting away from us. Need to catch up.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 13:49:10	-15.098353	-173.753498	7317	54	3	1477	Lots of these stalked animals all over the sides of rocks. Coral too.
2009/05/12 13:50:28	-15.098326	-173.753379	7319	55	3	1472	Piles of sand on the pillows are quite peaked..
2009/05/12 13:50:47	-15.098306	-173.753342	7320	53	4	1471	Big draping tube.
2009/05/12 13:51:30	-15.098271	-173.753259	7322	52	3	1467	Coral on rock.
2009/05/12 13:52:08	-15.098220	-173.753203	7324	52	5	1462	Rising up another steep slope. Stacked pillars or talus.
2009/05/12 13:52:29	-15.098186	-173.753172	7325	53	5	1460	Talus and broken pillows.
2009/05/12 13:53:14	-15.098113	-173.753122	7328	25	6	1455	Elongate pillows.
2009/05/12 13:53:38	-15.098098	-173.753108	7329	47	10	1451	Very steep wall of elongate pillows.
2009/05/12 13:54:15	-15.098057	-173.753067	7331	34	11	1447	This is a very steep wall.
2009/05/12 13:55:15	-15.098042	-173.753049	7333	35	8	1448	Another red animal - maybe a soft coral?
2009/05/12 13:56:58	-15.098058	-173.753061	7336	34	7	1448	Breaking a piece off a rather large pillow. There is a red animal nearby and lots of the stalked critters on the side of this rock.
2009/05/12 13:58:18	-15.097972	-173.753034	7340	35	3	1445	Some pillows were broken after emplaced. Faulting? Rock was too tough. Abandoned sample. NO SAMPLE.
2009/05/12 13:58:36	-15.097943	-173.753025	7341	35	1	1445	Pillow that is all busted up.
2009/05/12 14:01:05	-15.097932	-173.752996	7344	51	4	1442	Tried to see if that could be broken off for a sample but no it could not.
2009/05/12 14:01:25	-15.097926	-173.752964	7346	64	4	1441	Lollipop sponges quite populous.
2009/05/12 14:02:01	-15.097900	-173.752941	7347	159	2	1444	Dave spotted a rock he thinks can be sampled.
2009/05/12 14:02:12	-15.097900	-173.752937	7349	158	2	1444	Coral hanging from bottom side of rock.
2009/05/12 14:04:17	-15.097881	-173.752871	7352	46	4	1441	Could not get a sample.
2009/05/12 14:04:39	-15.097875	-173.752811	7353	53	3	1441	Bottom is all sand here.
2009/05/12 14:04:52	-15.097862	-173.752785	7354	51	3	1440	Some lava dispersed on sand.
2009/05/12 14:05:06	-15.097847	-173.752760	7356	51	4	1437	Rubbly-looking lava.
2009/05/12 14:05:39	-15.097860	-173.752728	7357	28	3	1438	These rocks have a very different texture. Very rough and lumpy.
2009/05/12 14:09:08	-15.097742	-173.752711	7362	29	2	1435	Dave says it is sort of like an a' a' flow.
2009/05/12 14:09:39	-15.097668	-173.752641	7363	59	5	1431	Lots of sand everywhere here too.
2009/05/12 14:10:28	-15.097608	-173.752487	7365	57	5	1423	Seeing more of the pink soft corals.
2009/05/12 14:11:15	-15.097533	-173.752407	7367	56	7	1412	Now we are into another talus slope.
2009/05/12 14:12:07	-15.097443	-173.752312	7369	56	7	1401	This slope is rather steep.
2009/05/12 14:13:02	-15.097367	-173.752274	7370	32	9	1396	Pillows!
2009/05/12 14:13:07	-15.097367	-173.752269	7372	41	4	1396	Cracked pillow.
2009/05/12 14:13:23	-15.097361	-173.752260	7373	39	7	1395	Another pink coral.
2009/05/12 14:15:20	-15.097348	-173.752244	7377	2	3	1394	More pink corals.
2009/05/12 14:15:51	-15.097321	-173.752256	7378	85	1	1394	Crack goes through two pillows.
2009/05/12 14:16:17	-15.097329	-173.752263	7380	84	1	1394	Pink corals and lollipop critters on rocks.
2009/05/12 14:18:01	-15.097350	-173.752301	7382	85	1	1394	Broke piece off cracked pillow that also happens to have one of the soft pink corals on it.
2009/05/12 14:19:07	-15.097353	-173.752324	7386	85	1	1394	Trying to put the sample into the stbd biobox.
2009/05/12 14:21:32	-15.097337	-173.752316	7389	70	4	1390	Lost sample trying to open bio box. NO SAMPLE
2009/05/12 14:22:42	-15.097264	-173.752182	7391	44	3	1386	Pillows are cracked along a similar trend. Fault through rift zone?
2009/05/12 14:23:01	-15.097266	-173.752192	7392	51	3	1387	Very long elongate pillow
2009/05/12 14:23:34	-15.097282	-173.752190	7394	54	2	1388	End of this tube of a pillow is broken and has material spilling out.
2009/05/12 14:25:09	-15.097277	-173.752187	7397	55	4	1384	SAMPLE Geology 10. **J420-rock-10**. Piece broken off the edge of this long elongate pillow with broken and contents spilling out. **[SW ridge crest. > 500m to summit]**
2009/05/12 14:26:43	-15.097111	-173.752022	7399	52	5	1371	J420-rock-10 cont. Catching up to ship. Sample at Lat 15 5.834'S 173 45.126'W Depth=1389m
2009/05/12 14:27:01	-15.097070	-173.752005	7400	53	5	1369	J420-rock-10 cont. Rock is being held in claw while catching up to ship.
2009/05/12 14:29:08	-15.096890	-173.751814	7404	52	4	1366	J420-rock-10 cont. Placing rock in GeoBox with one of the gastights.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 14:29:28	-15.096874	-173.751807	7405	52	4	1366	J420-rock-10 cont. Rock being placed into GeoBox#5
2009/05/12 14:32:45	-15.096823	-173.751732	7409	359	2	1369	**J420-sed-11**. Blue scoop of sediment. **[SW ridge crest]**
2009/05/12 14:33:05	-15.096830	-173.751733	7410	360	2	1369	Sand deposits on top of pillow lavas.
2009/05/12 14:35:29	-15.096889	-173.751771	7415	7	3	1368	J420-sed-11 cont (correction). Depth = 1370m
2009/05/12 14:35:57	-15.096824	-173.751778	7416	5	4	1365	J420-sed-11 cont. Sample placed in blue scoop behind starboard crate.
2009/05/12 14:37:15	-15.096685	-173.751757	7419	35	4	1364	Truncated pillows with a little bit of talus at the bottom.
2009/05/12 14:38:04	-15.096720	-173.751763	7420	43	3	1365	Waiting for Medea and doing some "house keeping."
2009/05/12 14:41:43	-15.096681	-173.751728	7425	28	5	1362	Looking for another rock to collect.
2009/05/12 14:42:59	-15.096725	-173.751741	7427	25	6	1363	SAMPLE Geology **J420-rock-12**. Pillow bud. **[SW ridge crest]**
2009/05/12 14:43:38	-15.096731	-173.751743	7429	27	5	1363	J420-rock-12 cont. Sample placed in geobox 3.
2009/05/12 14:44:50	-15.096640	-173.751727	7431	26	9	1354	Elongated pillows draped down scarp
2009/05/12 14:45:12	-15.096612	-173.751719	7433	27	7	1350	Sheet flow down open channel in pillows
2009/05/12 14:46:25	-15.096485	-173.751615	7435	31	3	1347	Lava is very fluid looking. Almost jumbled sheet flow. Sea of sand between pillows.
2009/05/12 14:46:33	-15.096467	-173.751598	7436	30	3	1347	Pillows look very contorted.
2009/05/12 14:46:58	-15.096443	-173.751566	7437	35	2	1346	Pit in sand.
2009/05/12 14:48:16	-15.096375	-173.751518	7440	31	2	1346	Looks like a little fissure that sand may have fallen into. A few little pits in a row with this fissure extending out of sand past pits.
2009/05/12 14:49:38	-15.096354	-173.751505	7442	31	2	1346	SAMPLE Geology 13. **J420-rock-13**. Trying to break edge off jumbled sheet flow. **[SW ridge crest]**
2009/05/12 14:49:55	-15.096354	-173.751505	7443	31	2	1346	J420-rock-13 cont.
2009/05/12 14:51:35	-15.096376	-173.751532	7446	32	3	1345	J420-rock-13 cont. Folded sheet. Very distinctive. Brownish color. Depth=1346m Lat 15 5.781'S Long 173 45.092'W
2009/05/12 14:51:53	-15.096387	-173.751539	7447	33	3	1345	J420-rock-13 cont. Placed in GeoBox#8a
2009/05/12 14:52:29	-15.096380	-173.751528	7449	29	1	1345	Yellow staining around sand.
2009/05/12 14:52:45	-15.096406	-173.751543	7450	29	2	1345	Looks bacterial.
2009/05/12 14:53:23	-15.096362	-173.751549	7452	28	3	1344	Sea of sand with lots of mat now.
2009/05/12 14:53:36	-15.096339	-173.751537	7453	29	3	1344	Mat is yellow color.
2009/05/12 14:53:50	-15.096325	-173.751518	7454	29	2	1344	Jumbled sheet flow sticks through sand here and there.
2009/05/12 14:54:08	-15.096303	-173.751499	7456	27	3	1343	Lobate lavas now.
2009/05/12 14:54:55	-15.096233	-173.751441	7457	27	1	1340	Looks like sheet flows are on top of lobate flows.
2009/05/12 14:55:19	-15.096208	-173.751419	7459	28	2	1338	Now there is lots of this yellow mat within the crevices between the lobes.
2009/05/12 14:56:09	-15.096147	-173.751361	7463	27	3	1335	Mat between lobes and all around.
2009/05/12 14:56:16	-15.096132	-173.751352	7464	28	3	1334	Black sand on top of lobes.
2009/05/12 14:56:22	-15.096122	-173.751340	7465	27	3	1334	Big mat area.
2009/05/12 14:56:44	-15.096065	-173.751307	7466	29	3	1332	Mat is blanketing the area.
2009/05/12 14:57:06	-15.096065	-173.751274	7468	39	3	1331	Now into talus and broken pillows.
2009/05/12 14:57:34	-15.096014	-173.751236	7469	37	3	1329	Mat between rocks in a few places but nothing as extensive as a minute ago.
2009/05/12 14:58:41	-15.095933	-173.751111	7471	33	4	1326	Going up a slope. Now seeing lots more mat.
2009/05/12 14:59:10	-15.095975	-173.751057	7473	33	3	1326	Jumbled sheet flow - big outcrop.
2009/05/12 14:59:29	-15.095960	-173.751025	7474	34	4	1325	Spots of yellow mat scattered about.
2009/05/12 14:59:55	-15.095982	-173.750972	7475	33	4	1324	Black gravelly slope.
2009/05/12 15:01:32	-15.096059	-173.750875	7478	35	5	1324	Sediments are black sand and gravel with lava sticking through here and there.
2009/05/12 15:01:50	-15.096064	-173.750872	7479	35	5	1324	The occasional yellow spot too.
2009/05/12 15:02:25	-15.096076	-173.750872	7481	35	5	1324	Ship is maneuvering. We're on the way to Mat Meadow.
2009/05/12 15:08:50	-15.095926	-173.750690	7488	35	16	1301	Going up another terrace scarp. Truncated pillows.
2009/05/12 15:08:58	-15.095921	-173.750679	7489	34	15	1300	Not so much yellow mats.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 15:09:07	-15.095919	-173.750671	7491	34	16	1299	Lots of black sand everywhere.
2009/05/12 15:09:31	-15.095918	-173.750667	7492	35	3	1297	Yellow mat increasing.
2009/05/12 15:10:02	-15.095922	-173.750664	7493	34	5	1294	Mat is pretty prolific especially between lobes .
2009/05/12 15:10:20	-15.095908	-173.750668	7495	35	2	1295	Elongate pillows.
2009/05/12 15:11:15	-15.095892	-173.750653	7497	37	9	1286	Pillow tube draped over another blockier lava block.
2009/05/12 15:11:52	-15.095816	-173.750599	7498	29	4	1284	Yellow mat is everywhere now.
2009/05/12 15:12:18	-15.095767	-173.750589	7500	40	3	1283	This reminds Jim Varnum of yellow snow.
2009/05/12 15:12:38	-15.095739	-173.750573	7501	35	3	1281	Now starting to see white in the mat too.
2009/05/12 15:12:59	-15.095748	-173.750567	7502	36	5	1280	Just rammed into the side of the slope. Stirred up a bunch of black sand.
2009/05/12 15:13:08	-15.095728	-173.750552	7504	35	5	1279	Sand here is deep.
2009/05/12 15:13:16	-15.095713	-173.750536	7505	34	4	1279	Now mat is mostly white.
2009/05/12 15:13:53	-15.095654	-173.750466	7506	31	2	1277	Bottom is mostly smooth. Low-relief outcrops of lava.
2009/05/12 15:14:20	-15.095671	-173.750405	7508	35	3	1277	White layer is pretty shallow. Jason plowing into sand here and there.
2009/05/12 15:15:06	-15.095649	-173.750356	7509	24	3	1276	Jim just started a big slide where he rammed the slope.
2009/05/12 15:17:10	-15.095624	-173.750293	7513	25	3	1276	SAMPLE Biology 14. **J420-mat-14**. Davis Sampler with beefed-up handle. White mat covering smooth sand slope. Slope is unstable and slides each time Jason rams into it. **[Mat Meadow]**
2009/05/12 15:18:03	-15.095632	-173.750294	7514	25	3	1276	J420-mat-14 cont. Lat 15 5.738'S 173 45.018'W Depth=1277
2009/05/12 15:18:38	-15.095641	-173.750303	7516	25	3	1276	Rick says temperature was consistent around 20 C so he does not need another temperature measurement
2009/05/12 15:18:56	-15.095647	-173.750311	7517	25	3	1276	J420-mat-14 cont. Removing Davis sampler from basket
2009/05/12 15:20:43	-15.095674	-173.750358	7520	24	3	1276	J420-mat-14 cont. Scraping up surficial white material as much as possible.
2009/05/12 15:23:05	-15.095671	-173.750382	7523	25	3	1276	J420-mat-14 cont. Made sure handle was opened fully. Now scraping up more white material.
2009/05/12 15:24:28	-15.095661	-173.750378	7526	25	3	1276	White material is very thin layer on top of black sands. Sample is going to contain quite a bit of the sand too.
2009/05/12 15:26:34	-15.095659	-173.750372	7529	25	3	1276	J420-mat-14 cont. Closing tube.
2009/05/12 15:29:38	-15.095674	-173.750342	7533	25	3	1276	J420-mat-14 cont. Valve closed. Sample being replaced into basket where it started.
2009/05/12 15:33:55	-15.095648	-173.750364	7538	25	3	1276	Still replacing the Davis Sampler in the basket. Almost secured.
2009/05/12 15:44:11	-15.095701	-173.750375	7550	26	4	1275	Starting to move again.
2009/05/12 15:44:22	-15.095726	-173.750373	7551	26	5	1275	Now we want to got Luo vent.
2009/05/12 15:45:55	-15.095734	-173.750375	7553	350	6	1273	Expect white mat over mostly smooth sand surface until we get to Luo.
2009/05/12 15:47:19	-15.095590	-173.750380	7556	352	3	1275	Lines across mat exposing black sand beneath.
2009/05/12 15:47:29	-15.095583	-173.750381	7557	352	3	1274	Not sure how these lines got there.
2009/05/12 15:48:36	-15.095479	-173.750396	7559	351	2	1275	Seafloor is quite smooth. Almost like dunes.
2009/05/12 15:48:59	-15.095443	-173.750406	7560	351	2	1276	Spot of orange mat.
2009/05/12 15:49:13	-15.095421	-173.750412	7562	351	2	1276	Orange mat is in a slight depression.
2009/05/12 15:49:56	-15.095391	-173.750433	7563	42	3	1275	This is **Luo**.
2009/05/12 15:52:01	-15.095333	-173.750439	7566	27	1	1277	Fish near bottom of pit.
2009/05/12 15:52:34	-15.095350	-173.750446	7568	24	1	1276	Shrimp are here too.
2009/05/12 15:54:16	-15.095320	-173.750432	7571	78	1	1278	Shimmering water.
2009/05/12 15:54:28	-15.095324	-173.750429	7572	76	1	1278	Maneuvering into pit as best as possible.
2009/05/12 15:56:02	-15.095337	-173.750412	7573	87	195	1278	Want to take a suction sample.
2009/05/12 15:58:26	-15.095360	-173.750425	7574	87	176	1278	SAMPLE Biology 15. J420-shrimp-15. Blue chamber is standing by ready to receive shrimp.
2009/05/12 15:59:13	-15.095367	-173.750433	7575	87	193	1278	**J420-shrimp-15** cont. Sucking up shrimp. **[Luo]**
2009/05/12 16:00:44	-15.095368	-173.750443	7576	87	192	1278	Luo vent. Along rock ledge near top of pit. Lat 15 5.723'S Long 173 45.027'W. Depth=1280m
2009/05/12 16:03:55	-15.095332	-173.750426	7577	87	184	1278	J420-shrimp-15 cont. That last entry should have been labeled with the sample number too (J420-shrimp-15 cont)

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 16:05:22	-15.095336	-173.750410	7578	87	184	1278	Can see zoarcid fish in pit.
2009/05/12 16:05:29	-15.095336	-173.750409	7579	87	184	1278	Two of them.
2009/05/12 16:06:16	-15.095342	-173.750402	7580	87	184	1278	Taking a temperature near ledge where shrimp were captured. T=14.8
2009/05/12 16:07:33	-15.095345	-173.750395	7581	87	196	1278	Temperature at another spot on the ledge. Temp=5.5
2009/05/12 16:07:52	-15.095345	-173.750394	7582	87	196	1278	And another temperature=5.5
2009/05/12 16:08:19	-15.095345	-173.750394	7583	87	198	1278	And another temperature=5.8
2009/05/12 16:09:16	-15.095343	-173.750396	7584	87	198	1278	Yet another one Temp=12.0
2009/05/12 16:11:04	-15.095353	-173.750410	7585	87	2	1276	Rick Davis says our next destination is Epsilon vent.
2009/05/12 16:11:34	-15.095388	-173.750428	7587	81	5	1273	Moving out of Luo hole.
2009/05/12 16:12:19	-15.095448	-173.750428	7589	65	4	1273	Moving towards Epsilon vent.
2009/05/12 16:14:25	-15.095441	-173.750412	7592	52	4	1273	Deciding how best to get there.
2009/05/12 16:16:43	-15.095474	-173.750317	7595	91	6	1272	Rubble on seafloor.
2009/05/12 16:19:41	-15.095463	-173.750136	7599	90	2	1269	Lots of floc in water column and orange sediment on seafloor.
2009/05/12 16:19:56	-15.095459	-173.750123	7600	92	3	1269	Pillow talus.
2009/05/12 16:21:07	-15.095440	-173.750063	7602	92	3	1266	Still a dusting of pyroclastic sand.
2009/05/12 16:22:20	-15.095480	-173.749976	7605	92	3	1263	Lots of pyroclastic sand.
2009/05/12 16:22:59	-15.095479	-173.749947	7606	52	3	1263	Stopping to get a rock.
2009/05/12 16:23:57	-15.095463	-173.749935	7608	34	3	1263	Probably going to be a piece of lava with no glass.
2009/05/12 16:25:37	-15.095469	-173.749943	7611	35	3	1263	**J419-Rock-16** Geo sample 15 5.728S 173 44.996W z 1264 m PI Rubin Clague
2009/05/12 16:26:37	-15.095478	-173.749960	7613	34	3	1263	Rock 16 placed in with Rick's sampler in the starboard box
2009/05/12 16:27:35	-15.095479	-173.749978	7615	33	3	1263	Doppler reset
2009/05/12 16:28:12	-15.095460	-173.749968	7617	84	2	1261	Now we are continuing onto Epsilon
2009/05/12 16:29:34	-15.095502	-173.749850	7619	91	4	1255	Continuing up the slope with loose fragments and lots of pyroclastic sand
2009/05/12 16:30:00	-15.095493	-173.749810	7620	94	3	1253	Rocks here have a brownish color to them
2009/05/12 16:30:12	-15.095496	-173.749796	7622	87	3	1253	Little spots of mat here
2009/05/12 16:31:57	-15.095439	-173.749524	7624	87	5	1257	Lost the bottom
2009/05/12 16:33:45	-15.095307	-173.749241	7627	91	2	1257	More and more sand as we approach the summit but the rocks are also brown and look cooked
2009/05/12 16:34:45	-15.095255	-173.749137	7629	52	3	1255	We are looking at faults and collapse features.
2009/05/12 16:36:56	-15.095186	-173.749137	7632	42	4	1249	Fault blocks rather than eruptive ridges with talus everywhere.
2009/05/12 16:38:59	-15.095071	-173.749115	7635	19	3	1239	Steep slope of sand.
2009/05/12 16:39:54	-15.095054	-173.749121	7637	27	5	1236	Cliff of broken off pillows.
2009/05/12 16:40:02	-15.095056	-173.749122	7638	27	6	1235	Trying to see if anything is suitable for sampling.
2009/05/12 16:40:43	-15.095003	-173.749096	7640	24	12	1229	Now on top of the cliff everything buried in sand.
2009/05/12 16:41:33	-15.094958	-173.749068	7642	24	6	1225	More elongated pillows.
2009/05/12 16:42:03	-15.094934	-173.749052	7643	23	8	1222	Lots of truncated ones.
2009/05/12 16:42:39	-15.094918	-173.749027	7645	39	9	1219	Found nice collapsed pillow.
2009/05/12 16:42:51	-15.094913	-173.749015	7646	37	7	1217	Too late can't take it.
2009/05/12 16:43:47	-15.094899	-173.749003	7648	8	5	1219	Trying to sample another pillow.
2009/05/12 16:47:35	-15.094903	-173.749040	7653	1	5	1219	Rim of pillow with white stain is pretty crumbly.
2009/05/12 16:48:41	-15.094915	-173.749042	7655	30	6	1218	**J420-Rock-17** piece of this broken off pillow depth 1220m 15 5.694S 173 44.942 W PI Clague Rubin
2009/05/12 16:49:31	-15.094883	-173.748979	7657	39	3	1217	That rock was on the ridge south of Hades **[due S of Hades about 25m]**
2009/05/12 16:49:47	-15.094878	-173.748947	7658	39	4	1215	Rift parallel ridge that is fault bounded.
2009/05/12 16:49:54	-15.094874	-173.748933	7659	40	3	1215	Carrying the rock to Epsilon.
2009/05/12 16:50:16	-15.094876	-173.748905	7661	40	4	1214	Starting to see Hades plume.
2009/05/12 16:50:56	-15.094878	-173.748861	7662	41	11	1208	Going up a sheer wall.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 16:51:02	-15.094876	-173.748853	7663	41	12	1207	Draped lavas.
2009/05/12 16:51:40	-15.094851	-173.748803	7665	39	3	1203	We are about 40m from Epsilon.
2009/05/12 16:52:59	-15.094621	-173.748632	7667	41	4	1199	Lots of sand and in the plume.
2009/05/12 16:53:12	-15.094583	-173.748602	7669	41	5	1197	Some outcrop which is pillow lava on right just a few talus chunks on the left.
2009/05/12 16:53:28	-15.094548	-173.748574	7670	41	6	1194	We are in the lost scoop sampler area so we are keeping an eye out.
2009/05/12 16:53:48	-15.094500	-173.748530	7671	39	5	1191	Near Red Rock Ridge.
2009/05/12 16:54:15	-15.094459	-173.748477	7673	42	7	1186	We've caught up with Medea and the ship.
2009/05/12 16:55:33	-15.094352	-173.748402	7675	328	5	1180	Going to stop and store Rock 17 right here in front of Red Rock Ridge.
2009/05/12 16:56:01	-15.094351	-173.748399	7676	328	6	1180	Rock 17 is going in with Rick's sampler on the starboard side of it.
2009/05/12 16:57:12	-15.094367	-173.748412	7679	328	6	1180	It just broke in half and fell on top of rock 16.
2009/05/12 16:57:53	-15.094381	-173.748430	7680	327	6	1180	It got snagged on the gastight and broke and a small piece is still sitting on the basket.
2009/05/12 16:58:01	-15.094384	-173.748433	7681	327	6	1180	There's a shrimp.
2009/05/12 16:58:28	-15.094391	-173.748446	7683	327	6	1180	Other part of the rock is on top of the gastight.
2009/05/12 17:00:09	-15.094390	-173.748485	7686	319	6	1179	We are seeing marker from Red Rock Ridge.
2009/05/12 17:01:32	-15.094391	-173.748541	7688	350	6	1183	Looking for Epsilon.
2009/05/12 17:03:16	-15.094458	-173.748605	7691	338	10	1187	Seeing some extensive white staining.
2009/05/12 17:03:44	-15.094427	-173.748617	7692	338	6	1187	Big extensive white area.
2009/05/12 17:04:22	-15.094413	-173.748590	7694	11	3	1186	Back on just pyroclastic sands still looking for Epsilon.
2009/05/12 17:05:33	-15.094504	-173.748508	7696	11	6	1184	We think we might be on the wrong side of the ridge.
2009/05/12 17:05:57	-15.094499	-173.748509	7697	11	7	1184	Moving to the other side of the ridge now
2009/05/12 17:06:32	-15.094471	-173.748514	7699	10	7	1180	Going up over red rocks with some white staining.
2009/05/12 17:06:46	-15.094469	-173.748522	7700	10	8	1179	Can again see the Red Rock Ridge marker.
2009/05/12 17:07:11	-15.094417	-173.748547	7702	30	4	1181	Jimmy thinks he sees Epsilon.
2009/05/12 17:08:00	-15.094290	-173.748556	7703	45	4	1182	We see a marker ahead.
2009/05/12 17:08:17	-15.094273	-173.748558	7705	91	5	1183	Marker 147 which is Epsilon.
2009/05/12 17:08:29	-15.094270	-173.748566	7706	131	7	1184	Can see Epsilon in view now.
2009/05/12 17:08:56	-15.094271	-173.748569	7707	163	7	1185	Nice white map waving in the wind.
2009/05/12 17:09:27	-15.094271	-173.748565	7709	185	3	1186	Settling down to sample Epsilon.
2009/05/12 17:10:10	-15.094261	-173.748581	7711	189	3	1186	We've stirred it up quite a bit.
2009/05/12 17:10:13	-15.094260	-173.748581	7712	189	3	1186	Lined up on red to do a suction.
2009/05/12 17:11:33	-15.094252	-173.748596	7714	188	3	1186	It has cleared up so we are preparing to suction the mat
2009/05/12 17:12:19	-15.094257	-173.748593	7716	189	3	1186	**J420-mat-18 [Epsilon - Mkr-147]** Depth 1187 Red Bottle PI Davis
2009/05/12 17:12:32	-15.094259	-173.748590	7717	188	3	1186	There is red mat underneath the white mat.
2009/05/12 17:13:12	-15.094267	-173.748580	7719	188	3	1186	Clogged so turning the sampler on and off to see if we can free up the screen.
2009/05/12 17:13:52	-15.094275	-173.748569	7720	188	3	1186	Flushing.
2009/05/12 17:14:33	-15.094280	-173.748560	7722	189	3	1186	Indexing back to red bottle.
2009/05/12 17:14:49	-15.094280	-173.748558	7723	189	3	1186	No animals here which is kind of surprising.
2009/05/12 17:15:21	-15.094277	-173.748555	7725	189	3	1186	We are unable to suction anything now.
2009/05/12 17:16:12	-15.094268	-173.748556	7727	188	3	1186	Switching to green chamber to try to see if we can get it to working.
2009/05/12 17:16:47	-15.094260	-173.748559	7728	188	3	1186	**J420-mat-19** BIO sample. **[Epsilon - Mkr-147]** Depth 1187 Green Bottle PI Davis
2009/05/12 17:17:45	-15.094250	-173.748563	7730	188	3	1186	Again seeing red beneath the white mat.
2009/05/12 17:18:49	-15.094248	-173.748562	7732	187	3	1186	We have cleaned that rock off pretty good.
2009/05/12 17:19:02	-15.094249	-173.748561	7733	187	3	1186	Rick predicts this mat would grow back in a matter of days.
2009/05/12 17:19:31	-15.094252	-173.748559	7735	187	3	1186	Going to flush jar.
2009/05/12 17:20:28	-15.094261	-173.748553	7737	187	3	1186	Sucking a bit more here into the green jar after flushing.
2009/05/12 17:22:45	-15.094274	-173.748561	7740	187	3	1186	Flushing slurp.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 17:27:31	-15.094266	-173.748575	7746	188	3	1185	Dropped a weight.
2009/05/12 17:28:10	-15.094266	-173.748574	7748	187	4	1185	Moving to Marker 154 which is according to Akel White Mat where we think there might be shrimp.
2009/05/12 17:29:27	-15.094325	-173.748564	7750	89	5	1179	A little unsure of the nav so will look for the marker.
2009/05/12 17:29:56	-15.094331	-173.748543	7751	88	4	1178	Red Rock Ridge marker in view.
2009/05/12 17:30:04	-15.094325	-173.748535	7752	88	5	1178	1168 is target depth.
2009/05/12 17:31:28	-15.094287	-173.748390	7755	87	4	1172	Lots of pyroclastic sand over elongated pillows.
2009/05/12 17:31:35	-15.094282	-173.748377	7756	87	2	1172	Some truncated pillow here.
2009/05/12 17:31:46	-15.094278	-173.748359	7757	88	2	1171	A ton of pyroclastic sand.
2009/05/12 17:31:50	-15.094279	-173.748353	7758	88	3	1170	Still going up.
2009/05/12 17:31:55	-15.094276	-173.748345	7759	88	3	1170	Little slump zone there.
2009/05/12 17:32:14	-15.094286	-173.748312	7761	88	5	1166	Marker in view.
2009/05/12 17:32:30	-15.094309	-173.748283	7762	75	4	1165	We are looking for shrimp here at **Mkr-154 White mat vent**.
2009/05/12 17:33:02	-15.094305	-173.748265	7763	6	8	1165	We want to look for shrimp.
2009/05/12 17:34:52	-15.094250	-173.748236	7766	20	5	1164	There are shrimp here so we want to settle in to sample.
2009/05/12 17:37:54	-15.094318	-173.748278	7770	22	4	1167	We have only seen one shrimp.
2009/05/12 17:38:36	-15.094311	-173.748276	7772	7	6	1167	Not worth suctioning one shrimp so we are going to head to Prometheus.
2009/05/12 17:39:39	-15.094302	-173.748272	7774	8	4	1167	The mat has not grown back from when we first sampled it.
2009/05/12 17:42:34	-15.094301	-173.748251	7778	8	4	1167	Shrimp swam by.
2009/05/12 17:43:07	-15.094296	-173.748252	7779	8	5	1167	Another shrimp.
2009/05/12 17:45:27	-15.094288	-173.748259	7783	8	5	1167	Heading to Prometheus.
2009/05/12 17:49:10	-15.094235	-173.748255	7788	7	2	1163	Steaming rocks below us.
2009/05/12 17:49:12	-15.094230	-173.748255	7789	6	2	1163	In a plume.
2009/05/12 17:49:51	-15.094138	-173.748244	7790	47	3	1165	Nice view of plume.
2009/05/12 17:50:55	-15.094048	-173.748206	7792	118	16	1170	Beautiful big plume.
2009/05/12 17:51:04	-15.094035	-173.748208	7793	118	14	1172	Heading down to bottom of **Prometheus**.
2009/05/12 17:52:25	-15.094004	-173.748208	7796	121	14	1174	We are moving the majors out of the way of the video.
2009/05/12 17:54:44	-15.094030	-173.748219	7799	121	14	1174	Stored the majors on top of the basket.
2009/05/12 17:55:09	-15.094040	-173.748221	7801	121	14	1174	We are about 10 m from the vent.
2009/05/12 17:56:58	-15.094066	-173.748211	7803	121	12	1174	No red so far in the eruption.
2009/05/12 17:57:16	-15.094067	-173.748211	7805	120	13	1174	We are going to watch this for a while to see how it changes.
2009/05/12 17:58:36	-15.094066	-173.748202	7807	121	12	1174	We are about 8m from the vent.
2009/05/12 17:59:28	-15.094062	-173.748200	7809	121	10	1176	Plume just sent out something fresh.
2009/05/12 17:59:42	-15.094062	-173.748199	7810	121	10	1177	Tons of white material in the water column.
2009/05/12 18:01:55	-15.094050	-173.748188	7813	121	10	1177	Looks like there is another plume up and behind this one.
2009/05/12 18:02:35	-15.094037	-173.748179	7815	141	9	1176	Going to scoot around to the left to see what is back there.
2009/05/12 18:02:45	-15.094030	-173.748172	7816	154	7	1176	It looks like it has built another cone around here.
2009/05/12 18:03:33	-15.094024	-173.748162	7818	155	6	1176	Very little rocks in the cloud.
2009/05/12 18:06:18	-15.093996	-173.748152	7822	155	6	1176	We are going to spend time just observing the plume.
2009/05/12 18:08:29	-15.094017	-173.748165	7825	155	7	1176	Increased activity.
2009/05/12 18:09:50	-15.094018	-173.748167	7827	155	7	1176	Beginning to see some rocks in the plume.
2009/05/12 18:11:11	-15.094005	-173.748162	7830	155	7	1176	Left part of vent becoming more active.
2009/05/12 18:13:26	-15.093987	-173.748149	7833	155	7	1176	Right side just erupted.
2009/05/12 18:13:44	-15.093986	-173.748147	7834	155	7	1176	Fish
2009/05/12 18:13:54	-15.093987	-173.748147	7835	155	6	1176	The fish is swimming into the plume.
2009/05/12 18:14:04	-15.093987	-173.748146	7836	155	7	1176	No sign of the fish.
2009/05/12 18:14:21	-15.093988	-173.748144	7838	155	6	1176	Increased activity.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 18:14:49	-15.093991	-173.748143	7839	155	7	1176	No rock is being added here at the vent right now.
2009/05/12 18:17:40	-15.094032	-173.748158	7843	152	8	1176	We are going to look for lava tubes here.
2009/05/12 18:17:57	-15.094020	-173.748165	7844	151	9	1177	Just going to back down to the northwest to look for lava tubes.
2009/05/12 18:18:46	-15.093992	-173.748201	7846	142	12	1176	Waiting for Medea.
2009/05/12 18:23:24	-15.094011	-173.748228	7852	139	8	1181	Continuing to back down.
2009/05/12 18:24:07	-15.094021	-173.748233	7853	139	8	1182	Looks like there might be some really fresh looking pillows here.
2009/05/12 18:24:54	-15.094047	-173.748232	7855	140	7	1184	Lovely pillows but don't look active.
2009/05/12 18:26:04	-15.094008	-173.748261	7857	140	10	1186	Now we are in debris and there is debris covering pillows.
2009/05/12 18:27:26	-15.093969	-173.748282	7860	139	8	1192	At some point it looks like **Prometheus** was producing pillows we've just never seen it.
2009/05/12 18:28:11	-15.093927	-173.748295	7862	139	9	1197	Passing 1195 and still seeing flow.
2009/05/12 18:29:02	-15.093871	-173.748312	7863	139	9	1199	Everything here looks covered in debris but there are still some black pillows in there.
2009/05/12 18:29:06	-15.093868	-173.748314	7864	140	9	1199	Old rock nearby.
2009/05/12 18:29:38	-15.093839	-173.748321	7866	139	7	1200	Now all debris.
2009/05/12 18:31:01	-15.093791	-173.748402	7868	139	7	1204	Back into a rubble pillow area at 1205m.
2009/05/12 18:31:10	-15.093792	-173.748408	7870	139	6	1205	It looks pretty new but it is not intact.
2009/05/12 18:33:19	-15.093839	-173.748519	7873	140	10	1206	We are still backing down to stay with Medea.
2009/05/12 18:34:15	-15.093817	-173.748581	7875	140	10	1211	Watch change.
2009/05/12 18:37:42	-15.093688	-173.748715	7879	140	10	1221	We are going around to the northeast lateral along.
2009/05/12 18:37:44	-15.093687	-173.748716	7880	141	10	1221	***Reset doppler.***
2009/05/12 18:38:36	-15.093673	-173.748705	7882	145	7	1224	Contouring around to the northeast at 1225m.
2009/05/12 18:39:18	-15.093644	-173.748671	7884	155	6	1224	Mainly just flow breccia here.
2009/05/12 18:40:22	-15.093593	-173.748587	7886	171	7	1222	Some more recent looking rubble here.
2009/05/12 18:41:46	-15.093582	-173.748460	7888	189	4	1221	We have not been recording DVCam because HD is not working.
2009/05/12 18:44:16	-15.093485	-173.748459	7892	170	5	1227	We're looking for active pillows at the base of Prometheus.
2009/05/12 18:53:12	-15.093400	-173.748332	7902	179	5	1228	We're looking around the base of Prometheus.
2009/05/12 18:53:32	-15.093415	-173.748315	7903	132	5	1227	We've decided to move to Akel's Afi and look at that vent.
2009/05/12 18:54:17	-15.093419	-173.748284	7905	139	4	1227	Precipitation by microbes. A little pillow covered by microbes.
2009/05/12 18:57:21	-15.093462	-173.748327	7910	143	4	1226	We're going to Hades now.
2009/05/12 18:57:36	-15.093465	-173.748332	7911	143	4	1226	Intact lava flow coming down here where the map shows a ridge.
2009/05/12 18:58:03	-15.093468	-173.748343	7912	200	3	1226	These flows are in place and covered with debris.
2009/05/12 18:58:51	-15.093488	-173.748366	7914	211	2	1227	We're going to go to Hades first then to Akel's vent.
2009/05/12 19:01:46	-15.093509	-173.748388	7918	206	4	1223	We're waiting for the ship.
2009/05/12 19:02:35	-15.093496	-173.748384	7920	206	4	1223	Prometheus was mainly ashing and producing fine-grained ash but not much explosive activity.
2009/05/12 19:05:22	-15.093578	-173.748399	7924	223	3	1216	We're moving now. Driving along the slope now.
2009/05/12 19:06:03	-15.093621	-173.748391	7925	210	3	1213	We're looking at intact flows right now.
2009/05/12 19:06:20	-15.093640	-173.748395	7927	209	2	1213	Possibly some pillow lavas and lots of rubble coming down.
2009/05/12 19:06:41	-15.093663	-173.748403	7928	210	3	1212	Anything downslope here will look old because it will be covered with material from the vent.
2009/05/12 19:07:52	-15.093738	-173.748425	7930	210	2	1211	Covering of small debris from better.
2009/05/12 19:08:19	-15.093728	-173.748445	7932	211	4	1210	The pilot cam is being recorded to DVCam and DVD because we don't have HD on this dive.
2009/05/12 19:08:59	-15.093765	-173.748458	7933	212	3	1210	Broken off pillow lavas. Nice little tube ahead but doesn't look in place.
2009/05/12 19:09:13	-15.093780	-173.748457	7935	212	3	1210	Looks like there are some intact pillows under the debris.
2009/05/12 19:11:53	-15.093876	-173.748549	7938	168	4	1210	Orange mat in front of us.
2009/05/12 19:12:10	-15.093895	-173.748558	7940	176	3	1210	Could be staining on the rocks. More likely staining.
2009/05/12 19:12:28	-15.093914	-173.748558	7941	176	3	1209	We're on the edge of a cliff here.
2009/05/12 19:13:06	-15.093930	-173.748571	7942	160	5	1209	Could be young clastics and debris. Could be microbial mat or sulfur balls.
2009/05/12 19:13:43	-15.093925	-173.748580	7944	176	6	1208	We saw a several shrimp here. Shrimp are grazing on the mat here.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 19:14:05	-15.093919	-173.748589	7945	174	7	1207	Lots of leaking warm water here. We've seen shrimp and mat. Depth here is 1208.
2009/05/12 19:14:19	-15.093918	-173.748601	7947	172	7	1208	Not much material raining down here.
2009/05/12 19:15:24	-15.093952	-173.748657	7949	174	6	1207	This could be a big lobe of lava that is covered with lava and leaking flow all over the place.
2009/05/12 19:16:14	-15.093990	-173.748683	7951	174	5	1206	We have about 50m or so to go to Akel's Afi.
2009/05/12 19:16:33	-15.093995	-173.748698	7952	174	7	1205	Afi means Fire in Tongan.
2009/05/12 19:18:33	-15.094097	-173.748804	7955	201	7	1207	More venting (staining and orange mats) and possibly other kinds of mat.
2009/05/12 19:20:09	-15.094114	-173.748773	7958	108	6	1205	Now we're seeing an outcrop of older lavas onlapped with younger pillows. Cool lava tube ahead.
2009/05/12 19:20:44	-15.094124	-173.748773	7959	162	9	1202	Sheets of these flows with long pillow tubes coming down.
2009/05/12 19:21:08	-15.094155	-173.748757	7960	163	10	1198	Elongate pillows. Could be an old eruptive vent here.
2009/05/12 19:21:18	-15.094167	-173.748763	7962	164	11	1197	Looks like an old vent.
2009/05/12 19:21:32	-15.094170	-173.748774	7963	193	6	1198	We're moving on to the active vents. Getting really smoky here now.
2009/05/12 19:22:23	-15.094225	-173.748817	7965	198	5	1201	We're almost even with Akel's vent now. Seeing white staining.
2009/05/12 19:22:38	-15.094256	-173.748830	7966	197	7	1200	Diffuse venting and fresh lavas coming down slope here with lots of staining on them.
2009/05/12 19:23:27	-15.094303	-173.748869	7968	172	8	1198	Big outcrop of fresh looking lavas.
2009/05/12 19:23:35	-15.094303	-173.748877	7969	175	9	1197	**There are 2 plumes here.**
2009/05/12 19:24:00	-15.094302	-173.748887	7970	143	9	1196	**There are 3 plumes here at this larger area.**
2009/05/12 19:24:49	-15.094299	-173.748863	7972	156	13	1195	**This is an active vent. It's the right depth. (Later named the whole area "Hades area")**
2009/05/12 19:25:46	-15.094368	-173.748979	7974	156	13	1198	This is one vent sites with several plumes.
2009/05/12 19:26:45	-15.094372	-173.748986	7976	152	13	1198	The two venting sites are about 5 meters apart.
2009/05/12 19:27:03	-15.094373	-173.748990	7977	152	13	1198	This one is building up quite the cone.
2009/05/12 19:27:32	-15.094375	-173.748997	7979	152	13	1198	Doesn't look like it is producing any lava now. As far as we can see. Vigorous plume. Not lots of tephra.
2009/05/12 19:28:22	-15.094390	-173.749014	7981	140	12	1198	This agrees with the nav. We're sitting between the 2 vents that are about 8 to 10 meters apart. This is a venting area.
2009/05/12 19:29:03	-15.094403	-173.749030	7982	114	12	1197	2 vents in this area. Moving in a little closer to get a better look.
2009/05/12 19:29:54	-15.094491	-173.749020	7984	100	11	1199	We are not seeing any red lava here. Little ash cone being built up here.
2009/05/12 19:30:56	-15.094503	-173.748996	7986	101	8	1200	Little cone of ash and debris building up around it. Just producing ash. Low-level activity. Steady white plume rising here.
2009/05/12 19:32:02	-15.094496	-173.748969	7989	95	4	1202	Fixed the iris. Seeing a lot of yellow smoke coming out. Steaming on the side. Venting coming out on the orifice.
2009/05/12 19:32:49	-15.094487	-173.748962	7991	94	4	1202	Gentle venting here. Not a lot of extrusion going on.
2009/05/12 19:33:18	-15.094481	-173.748959	7993	95	4	1202	Seems to be picking up a little bit.
2009/05/12 19:34:32	-15.094435	-173.748969	7995	106	6	1201	We're backing off a bit so we can get a bit better picture of the vent.
2009/05/12 19:34:45	-15.094431	-173.748971	7996	106	6	1201	Lots of sulfur in the smoke.
2009/05/12 19:36:21	-15.094434	-173.748980	7999	106	6	1200	Lasers on. Can see them in the DSC.
2009/05/12 19:37:00	-15.094442	-173.748980	8000	106	6	1200	That's a very nice shot in the pilot cam.
2009/05/12 19:37:33	-15.094451	-173.748980	8002	106	6	1200	Activity hasn't changed much. "Rotarian" activity.
2009/05/12 19:38:23	-15.094463	-173.748977	8003	106	6	1200	Little cinder cone built around the vent. They saw a little flame last time.
2009/05/12 19:38:51	-15.094468	-173.748976	8004	106	6	1200	It's getting more active. Seeing a bit of ash falling out of the plume now. More vigorous venting.
2009/05/12 19:38:58	-15.094469	-173.748975	8005	106	6	1200	The plume is rotating.
2009/05/12 19:41:26	-15.094461	-173.748979	8009	106	6	1200	Interval of quiescence and another burst of ash.
2009/05/12 19:42:01	-15.094455	-173.748984	8010	106	6	1200	Pretty big pieces of ash here.
2009/05/12 19:42:42	-15.094450	-173.748990	8012	106	6	1200	Anna Louise wants to get a hot sediment sample. She wants anything from 60C up.
2009/05/12 19:43:14	-15.094448	-173.748995	8013	106	6	1200	She wants finer grain sediments where there are more microbes.
2009/05/12 19:44:34	-15.094448	-173.749011	8016	106	6	1200	Ash is falling out of the vent.
2009/05/12 19:45:02	-15.094450	-173.749017	8017	106	6	1200	We see the other half of the (Akel's?) vent with flames shooting out.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 19:45:22	-15.094451	-173.749021	8019	106	6	1200	Ashing event has been going on for about 4 minutes with continual ashing and clasts.
2009/05/12 19:45:39	-15.094453	-173.749024	8020	106	6	1200	Flames are shooting out of the nearby vent so we are going to go and look at it.
2009/05/12 19:46:38	-15.094419	-173.749012	8022	82	7	1199	The one we have been looking at is to the east of the other vent.
2009/05/12 19:46:59	-15.094419	-173.749001	8023	90	7	1199	We seen some pillow lavas flowing downslope.
2009/05/12 19:47:20	-15.094430	-173.749000	8025	90	7	1198	(Akel's Afi - correction Hades Area). Seeing explosions now and pillow lavas.
2009/05/12 19:47:29	-15.094432	-173.749000	8026	89	6	1198	Glowing pillows at the bottom.
2009/05/12 19:48:13	-15.094433	-173.749000	8027	90	6	1198	Looking at more explosions in the pit. See fire. Can see the pillows forming at the base.
2009/05/12 19:48:29	-15.094434	-173.749000	8029	90	7	1198	This looks very much like Hades. (correction - because it was Hades).
2009/05/12 19:49:06	-15.094435	-173.748996	8030	90	7	1198	This vent is SW of Hades. (correction - bad nav, it was Hades)
2009/05/12 19:49:20	-15.094435	-173.748995	8032	90	6	1198	It's extruding pillow tubes.
2009/05/12 19:50:23	-15.094432	-173.748986	8034	90	7	1198	(correction: This area has been dubbed **"Hades Area"** after the dive it is not Akel's Afi area) Blowing big pieces out of the vent and the pillow is forming.
2009/05/12 19:51:08	-15.094411	-173.748959	8035	120	8	1197	Big pieces are falling out of the vent. Seeing lots of flaming.
2009/05/12 19:51:15	-15.094411	-173.748956	8036	119	8	1197	The whole thing lifted up.
2009/05/12 19:51:39	-15.094410	-173.748956	8038	120	9	1197	One foot to two foot pieces falling off the side of the vent.
2009/05/12 19:51:51	-15.094409	-173.748955	8039	120	9	1197	Wow. This is just amazing.
2009/05/12 19:52:10	-15.094406	-173.748954	8040	120	9	1197	A whole hot front has been exposed there.
2009/05/12 19:52:54	-15.094408	-173.748950	8042	120	8	1197	This whole piece is just expanding out. A big bubble of lava coming out of here.
2009/05/12 19:53:32	-15.094411	-173.748950	8044	120	8	1197	Big skins of lava coming out of this vent. See glowing lavas at the base.
2009/05/12 19:54:52	-15.094355	-173.748965	8046	124	7	1198	Tito's Colossus.
2009/05/12 19:55:14	-15.094358	-173.748968	8047	121	8	1197	Magma is just pushing everything out of the vent. Big sheaths of rock coming out of the vent.
2009/05/12 19:55:25	-15.094361	-173.748970	8049	124	8	1198	Extruding pillows forming.
2009/05/12 19:56:06	-15.094358	-173.748974	8050	126	7	1200	This is perhaps the most active that we've seen any of the vents.
2009/05/12 19:56:25	-15.094353	-173.748981	8052	128	7	1201	Now we are seeing lava extrusion down a few meters below the vent.
2009/05/12 19:56:40	-15.094356	-173.748979	8053	128	7	1201	At least 2 pillows forming. Active tubes flowing downslope.
2009/05/12 19:57:06	-15.094375	-173.748991	8054	88	7	1200	Can't really see them that well. Looks like at least 3 of them forming now.
2009/05/12 19:57:38	-15.094407	-173.749019	8056	94	6	1200	Smoky right now. Going to give it a bit of time to clear out.
2009/05/12 19:59:00	-15.094398	-173.748968	8058	104	8	1200	**Dual activity here. Seeing 2 vents. Several pillows being formed here but it's hard to see.**
2009/05/12 20:00:04	-15.094381	-173.748953	8060	110	14	1194	The pilot cam and the brow cams are the only ones we are recording now. **The pilot cam is what we will use for "science cam".**
2009/05/12 20:00:55	-15.094372	-173.748942	8062	116	12	1196	Bob wants to record Medea video on one of the videos.
2009/05/12 20:01:17	-15.094377	-173.748942	8064	116	12	1196	Lots of explosive activity happening. Big explosions going on all the time in the vent.
2009/05/12 20:01:50	-15.094378	-173.748941	8065	116	12	1196	Domes of lava forming and exploding out. Lots of tephra pouring out as well.
2009/05/12 20:02:27	-15.094380	-173.748943	8067	116	11	1196	Want to record some of the Medea cam too.
2009/05/12 20:02:58	-15.094385	-173.748947	8068	116	11	1196	Seeing pillows coming out down below and explosive activity at the top.
2009/05/12 20:03:29	-15.094373	-173.748961	8070	122	12	1196	The Medea camera has just started recording.
2009/05/12 20:03:50	-15.094372	-173.748965	8071	117	13	1198	The Medea cam is now recording. It will be out of sync with the rest of the videos.
2009/05/12 20:04:00	-15.094374	-173.748966	8072	118	12	1197	Can see the whole front of the pillow flowing out.
2009/05/12 20:04:54	-15.094376	-173.748974	8074	119	13	1197	We're seeing a pillow continuously extruding down slope in the brow cam.
2009/05/12 20:06:08	-15.094382	-173.748971	8076	119	11	1197	Really high level of activity here. Akel's (correction - **Hades**) vent just blew a **smoke ring**.
2009/05/12 20:06:28	-15.094379	-173.748970	8078	119	11	1197	We just saw a smoke ring in the Medea cam.
2009/05/12 20:07:24	-15.094369	-173.748964	8080	119	12	1197	More lava being extruded right there.
2009/05/12 20:07:45	-15.094365	-173.748962	8081	119	11	1197	Hard to know which camera to look at here. Lots of explosions yet but smoke is less.
2009/05/12 20:07:55	-15.094363	-173.748962	8082	119	12	1197	Lots of extrusions.
2009/05/12 20:08:18	-15.094359	-173.748960	8084	119	12	1197	Pillow lava extrusions happening at the base.
2009/05/12 20:08:36	-15.094357	-173.748960	8085	119	11	1197	Sometimes you see big flashes and pillow lavas just open up.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 20:09:19	-15.094353	-173.748959	8087	119	12	1197	Big lava bombs coming down.
2009/05/12 20:09:35	-15.094353	-173.748959	8088	119	12	1197	**Amazing flashes of flame.**
2009/05/12 20:09:48	-15.094352	-173.748959	8089	119	12	1197	Activity has actually died down a bit - believe it or not.
2009/05/12 20:10:15	-15.094353	-173.748958	8090	119	12	1197	Lots of pillows at the base. The last burst put big clasts high up in the water column.
2009/05/12 20:10:54	-15.094358	-173.748958	8092	120	9	1197	Moving in a little closer to the vent now.
2009/05/12 20:11:18	-15.094358	-173.748958	8094	119	9	1197	Close up and personal. That whole level of activity went on for 20 - 30 minutes or so.
2009/05/12 20:11:38	-15.094360	-173.748957	8095	119	9	1197	Still seeing flaming so nothing calm about it.
2009/05/12 20:13:12	-15.094365	-173.748948	8097	119	10	1197	Amazing level of activity.
2009/05/12 20:14:04	-15.094370	-173.748941	8099	119	10	1197	Ctenophore.
2009/05/12 20:14:10	-15.094370	-173.748941	8100	119	10	1197	Huge burst of lava.
2009/05/12 20:15:46	-15.094353	-173.748902	8103	163	6	1198	We're moving around to get a better view of the vent and the lava extrusions.
2009/05/12 20:15:54	-15.094350	-173.748900	8104	163	7	1198	No shrimp here says Tim.
2009/05/12 20:16:41	-15.094341	-173.748902	8106	164	7	1198	Can see the new flow that is coming down the slope on the right side of the screen. The vent is exploding on the left.
2009/05/12 20:18:11	-15.094305	-173.748910	8108	165	8	1198	Wow we are seeing pieces of the pillows coming down the slope in the upper left.
2009/05/12 20:18:19	-15.094303	-173.748910	8110	165	8	1198	We're at 1199 meters.
2009/05/12 20:19:36	-15.094295	-173.748908	8112	165	8	1198	**Can see the pillows flaming here and eruptive bursts.**
2009/05/12 20:19:48	-15.094295	-173.748908	8113	165	8	1198	Good camera position in the Medea cam.
2009/05/12 20:20:44	-15.094303	-173.748907	8115	166	8	1198	It's like fireworks. Seeing lots of explosive activity on top.
2009/05/12 20:22:26	-15.094336	-173.748910	8118	166	8	1198	**VIDEO Start recording DVCam The DVCam was shut off for some time now. IT WAS OFF FOR ABOUT A HALF AN HOUR**
2009/05/12 20:22:43	-15.094341	-173.748912	8119	166	8	1198	**DVDs were running but not the DVCam.**
2009/05/12 20:23:34	-15.094353	-173.748919	8121	166	8	1198	So unfortunately we missed a lot of the high level activity on the DVCam.
2009/05/12 20:24:24	-15.094356	-173.748925	8123	166	8	1198	It's still chugging away.
2009/05/12 20:24:59	-15.094352	-173.748927	8124	166	8	1198	It's more smoky here.
2009/05/12 20:25:30	-15.094345	-173.748927	8126	166	8	1198	Still lots of explosive activity in the pit. Large clasts coming out.
2009/05/12 20:25:48	-15.094340	-173.748926	8127	166	8	1198	Seeing lots of bursts.
2009/05/12 20:26:07	-15.094334	-173.748925	8128	166	8	1198	Messing around with the focus.
2009/05/12 20:26:44	-15.094322	-173.748921	8130	166	8	1198	Big piece of magma being extruded now.
2009/05/12 20:27:53	-15.094307	-173.748918	8132	164	8	1198	Huge pieces of tephra falling out of the plume.
2009/05/12 20:28:17	-15.094331	-173.748912	8133	169	6	1198	Tito was 6 or 8 meters away. Trying to get the big picture.
2009/05/12 20:28:35	-15.094357	-173.748910	8135	165	3	1198	The whole top lifted up.
2009/05/12 20:29:02	-15.094355	-173.748909	8136	166	3	1198	Those big flat things are the skin of the lava bubbles as they come down.
2009/05/12 20:29:31	-15.094358	-173.748909	8139	166	3	1198	We saw a shrimp.
2009/05/12 20:30:01	-15.094364	-173.748910	8140	166	3	1198	See some pillows down below.
2009/05/12 20:30:18	-15.094367	-173.748910	8142	166	3	1198	The whole side is rafting off of the vent.
2009/05/12 20:30:39	-15.094372	-173.748911	8143	166	3	1198	It's almost like an 'a ha' flow. We have everything in 56 minutes.
2009/05/12 20:32:00	-15.094386	-173.748913	8145	166	3	1198	It's like spatter. The whole side collapsed.
2009/05/12 20:32:24	-15.094387	-173.748913	8147	166	3	1198	Another smoke ring in Medea cam that is trailing smoke.
2009/05/12 20:32:44	-15.094387	-173.748913	8148	166	3	1198	Volcanic smoke rings at 0932 on the Medea cam.
2009/05/12 20:34:35	-15.094376	-173.748902	8151	166	4	1197	Anna Louise is comparing it to birth.
2009/05/12 20:34:55	-15.094374	-173.748900	8152	166	4	1197	It's starting to overrun the white rock.
2009/05/12 20:35:15	-15.094372	-173.748898	8153	166	4	1197	**It seems to be a half a meter higher than it was when we came.**
2009/05/12 20:35:45	-15.094370	-173.748896	8155	166	4	1197	Look at the lava flowing down slope just pouring out of the lava tube.
2009/05/12 20:36:34	-15.094370	-173.748896	8157	165	4	1197	It has grown. Just amazing.
2009/05/12 20:36:51	-15.094371	-173.748897	8158	165	4	1197	The lasers are on the DSC.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 20:37:45	-15.094363	-173.748902	8160	162	5	1197	The pit is about 2 meters across. The biggest of the 2 bubbles are about 1 meter across.
2009/05/12 20:37:58	-15.094366	-173.748898	8161	165	4	1197	There are 2 explosion sites. One in the back and one in the front.
2009/05/12 20:38:37	-15.094366	-173.748901	8163	166	4	1197	Speculating what we are looking at. Hydrogen explosions? Magma?
2009/05/12 20:39:28	-15.094389	-173.748904	8165	166	4	1197	There are several places where it is doing its explosions in the cone.
2009/05/12 20:40:37	-15.094378	-173.748898	8167	166	3	1197	There are now multiple sites of explosions.
2009/05/12 20:41:13	-15.094371	-173.748893	8168	166	3	1197	Huge bursts again. Huge chunks of lava skin falling off.
2009/05/12 20:41:28	-15.094369	-173.748891	8171	167	4	1196	Big extrusive spine coming out pushed by the expanding lava.
2009/05/12 20:42:30	-15.094361	-173.748883	8173	167	4	1197	Quite a bit of particulates in the water.
2009/05/12 20:43:04	-15.094360	-173.748881	8174	166	4	1197	Tito just came up a half a meter to avoid the bar in the top of the frame. It's building in front of us.
2009/05/12 20:43:26	-15.094362	-173.748882	8176	166	4	1197	We are being spoiled.
2009/05/12 20:43:43	-15.094363	-173.748883	8177	166	4	1197	Another smoke ring forming. Can see it in the Medea cam.
2009/05/12 20:43:59	-15.094365	-173.748885	8178	167	4	1197	Big chunks of rock tumbling down slope.
2009/05/12 20:44:24	-15.094369	-173.748889	8180	167	4	1197	Making new topography right in front of us. Big pile of cinders and pillows being extruded at the base here.
2009/05/12 20:45:20	-15.094372	-173.748902	8182	144	7	1196	Huge chunks are falling on top of the extruding pillow.
2009/05/12 20:45:50	-15.094371	-173.748914	8183	142	8	1195	Incredible amount of productive activity happening.
2009/05/12 20:47:14	-15.094382	-173.748936	8185	142	10	1195	Tito is swapping out the pilot seat with Scott.
2009/05/12 20:49:32	-15.094371	-173.748926	8189	166	6	1196	Chunks of magma bubble falling down slope. "Spatter bubbles".
2009/05/12 20:50:32	-15.094359	-173.748906	8191	182	5	1196	That's a nice angle because there is no smoke in the front. Can actually see the cooling of the bubble rind.
2009/05/12 20:51:00	-15.094364	-173.748879	8192	207	3	1195	Strombolian bubble bursts says Clague. Joe is calling it hydrogen explosions.
2009/05/12 20:51:47	-15.094381	-173.748873	8194	211	2	1195	Clague says it's white sulfur dioxide gas coming out of there. We don't see any CO2 bubbles rising out of the plume like we saw at NW Rota-1.
2009/05/12 20:52:30	-15.094399	-173.748866	8196	202	2	1195	Seeing the molten base of this cone.
2009/05/12 20:52:38	-15.094393	-173.748865	8197	203	3	1195	Tim saw a lonely shrimp.
2009/05/12 20:53:32	-15.094405	-173.748867	8199	179	5	1194	Watching pillows cracking and extruding on the brow cam.
2009/05/12 20:54:28	-15.094319	-173.748903	8201	166	13	1196	It's more like the side of the cone collapsing. Seeing these cracks in pillows all along the base of the cone.
2009/05/12 20:54:44	-15.094297	-173.748927	8202	169	15	1197	Following the pillow that is forming here.
2009/05/12 20:55:22	-15.094304	-173.749003	8204	137	11	1203	Seeing all these cracks in the pillows.
2009/05/12 20:56:09	-15.094272	-173.749019	8205	175	8	1209	Moving down from the main explosive vent. Backing over the pillow flow front.
2009/05/12 20:56:58	-15.094273	-173.749026	8207	126	7	1210	Seeing a little pillow steaming. We're now at 1211 meters.
2009/05/12 20:57:45	-15.094319	-173.749042	8209	132	7	1208	Looking at glowing pillows going down slope.
2009/05/12 20:59:04	-15.094282	-173.749059	8211	133	9	1208	We're down slope from the vent now about 5 meters. Lots of glowing active pillows.
2009/05/12 20:59:43	-15.094274	-173.749053	8213	132	7	1211	Little degassing tubes.
2009/05/12 21:00:02	-15.094280	-173.749054	8214	176	8	1210	We're now about 14 meters below the vent.
2009/05/12 21:01:14	-15.094294	-173.749039	8216	153	7	1211	Looking at all of these pillows here. At least 4 or 5 different active pillows forming here.
2009/05/12 21:01:54	-15.094288	-173.749026	8218	165	8	1211	We can count 7 glowing pillows in the pilot cam right now.
2009/05/12 21:02:30	-15.094284	-173.749013	8220	167	7	1212	We're 14 meters downslope from the vent (correction: **Hades Area**)
2009/05/12 21:03:26	-15.094269	-173.748993	8222	193	6	1212	Large pillow forming in front of us now.
2009/05/12 21:03:57	-15.094257	-173.748991	8223	193	7	1212	Zooming in on this larger pillow forming.
2009/05/12 21:04:21	-15.094243	-173.748991	8226	195	8	1211	We just had a land slide coming down slope.
2009/05/12 21:04:38	-15.094258	-173.748989	8227	192	8	1211	Mass wasting from the head of the pit.
2009/05/12 21:04:59	-15.094295	-173.748992	8228	184	6	1211	We're heading back up to the vent.
2009/05/12 21:05:24	-15.094315	-173.748987	8230	149	6	1210	Flaming rock (pillow) is falling down hill.
2009/05/12 21:06:21	-15.094339	-173.748991	8232	148	6	1207	Looking at huge pillows falling down slope. Seeing pillows and spatter.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 21:06:57	-15.094349	-173.748991	8233	143	6	1205	The new stuff is really silver.
2009/05/12 21:07:17	-15.094356	-173.748993	8234	141	7	1204	Nice view of what is being emplaced.
2009/05/12 21:07:32	-15.094360	-173.748995	8236	139	6	1205	Wow we're seeing this pillow move downslope.
2009/05/12 21:07:53	-15.094366	-173.748999	8237	136	5	1206	Lava is just pouring out of this pillow.
2009/05/12 21:08:01	-15.094348	-173.748998	8238	91	5	1205	Something coming in from the side.
2009/05/12 21:10:39	-15.094352	-173.749041	8242	176	6	1209	There was quite a slide. Tito wants to go back up and look at the vent and make sure we don't get overrun with tephra.
2009/05/12 21:11:07	-15.094385	-173.749027	8243	160	7	1204	Shrimp.
2009/05/12 21:11:53	-15.094378	-173.749010	8245	141	5	1200	Here's the vent right in front of us.
2009/05/12 21:12:04	-15.094356	-173.748998	8246	107	7	1199	This is the vent just to the east.
2009/05/12 21:12:13	-15.094358	-173.748995	8247	111	6	1198	Moving over to the more active vent.
2009/05/12 21:12:34	-15.094336	-173.748982	8249	82	7	1196	**The more active vent is just to the west of the milder vent 5 to 10 meters.**
2009/05/12 21:13:15	-15.094348	-173.748959	8250	141	11	1193	We see the whole scene right now.
2009/05/12 21:13:39	-15.094341	-173.748937	8252	158	10	1195	Looking at the flaming vent now.
2009/05/12 21:15:27	-15.094344	-173.748912	8255	159	11	1194	Retrieving the major sampler. Looking for the water rock reaction between the pillows and sea water.
2009/05/12 21:19:25	-15.094370	-173.748989	8260	152	6	1199	Dave Butterfield wants some of the gray smoke for the major sampler.
2009/05/12 21:21:45	-15.094381	-173.748941	8263	172	7	1195	Dave wants the gray smoke that is steaming out of the cooling pillows. Watching a pillow flowing down hill.
2009/05/12 21:25:08	-15.094375	-173.748893	8267	163	6	1197	SAMPLE Fluid 20. **J420-major-20**. Firing 2123. Coming up very slowly. In this white smoke near extruding pillows. Water-rock reactions. Good sample. **[Hades Area]**
2009/05/12 21:26:58	-15.094371	-173.748917	8270	165	9	1193	Discussing where to sample again.
2009/05/12 21:28:03	-15.094374	-173.748924	8272	165	9	1193	We're discussing the type of eruption we're witnessing. More like lava slugs than bubbles. The rind pieces are thicker than we would see in a strombolian bubble??
2009/05/12 21:28:17	-15.094374	-173.748925	8273	165	9	1193	Seeing flames in the upper left part of the screen.
2009/05/12 21:29:16	-15.094361	-173.748920	8275	167	9	1194	Looking at the active vent again. Cinder cone is throwing up smoke rings.
2009/05/12 21:30:16	-15.094352	-173.748905	8277	179	6	1197	When hydrogen burns it doesn't really make a gas. It makes water vapor. We aren't seeing any bubbles here.
2009/05/12 21:33:00	-15.094349	-173.748923	8281	180	4	1199	SAMPLE Fluid 21. **J420-major-21**. Yellow major sampler. Right here where the gray smoke is forming next to new forming pillows. The pillows are not red but are silver-like and new. **[Hades Area]**
2009/05/12 21:33:39	-15.094353	-173.748933	8283	180	4	1199	The first major was the black (sample #20).
2009/05/12 21:35:35	-15.094380	-173.748961	8286	179	4	1199	Samples 20 and 21 were taken close to Afi (which we later decided was Hades).
2009/05/12 21:36:41	-15.094391	-173.748968	8288	180	4	1199	SAMPLE Gas 22 **J420-gtb-22**. Firing the red gastight in the same area where we took the last 2 majors. **[Hades Area]**
2009/05/12 21:37:46	-15.094387	-173.748969	8290	179	4	1199	Samples 20 - 22 were taken downslope from the active fiery vent. Depth is 1200 meters.
2009/05/12 21:38:18	-15.094380	-173.748962	8291	165	7	1196	The more active of these 2 vents is to the NE of the other. The NE vent was flaming. The one to the SW was more like Rota.
2009/05/12 21:38:23	-15.094381	-173.748961	8293	165	8	1195	NAV Doppler reset
2009/05/12 21:39:40	-15.094375	-173.748947	8295	195	7	1192	Samples 20 - 22 were taken just downslope from the flaming vent (Hades Area) - about 2 meters downslope.
2009/05/12 21:41:35	-15.094341	-173.748925	8298	204	7	1194	Location here on top of the Afi (fiery) vent. 15 5.661. 173 44.936. Good location right at Akel's Afi. [correction: Hades Area]
2009/05/12 21:41:50	-15.094337	-173.748929	8299	206	7	1194	Chunks of new rock pouring down slope.
2009/05/12 21:42:06	-15.094335	-173.748925	8300	206	7	1194	Smoke ring in the Medea cam. It came from the lava projectile.
2009/05/12 21:42:46	-15.094314	-173.748937	8302	207	9	1194	Parting shot of this amazing area. Lava is just pouring down the side of this vent.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 21:43:56	-15.094335	-173.748960	8304	203	7	1195	**When we arrived here the vent was at 1198 meters Now it's 1194. This vent has grown about 4 meters in 2 hours.**
2009/05/12 21:45:02	-15.094329	-173.748964	8306	204	6	1198	Steaming pile of lava with pillow flowing off of it. Wow it's like lava goo. Toothpaste-like.
2009/05/12 21:45:19	-15.094334	-173.748964	8308	204	6	1199	Guesses at the temp of this is about 1500 C says Ken Rubin.
2009/05/12 21:47:36	-15.094442	-173.749063	8311	133	9	1198	The vent to the east of it is also flaming now.
2009/05/12 21:48:28	-15.094514	-173.749068	8313	110	5	1201	This vent is 10 m to the SE of the flaming cinder cone than that we have been observing for the last couple hours.
2009/05/12 21:50:12	-15.094609	-173.749076	8315	162	2	1198	We have been at Hades all this time.
2009/05/12 21:51:45	-15.094609	-173.749066	8318	162	2	1198	**WE HAVE BEEN AT HADES ALL THIS TIME. NOT AT AKEL'S AFI. WE HAVE BEEN THERE FOR CLOSE TO 3 HOURS.**
2009/05/12 21:52:40	-15.094600	-173.749073	8320	189	2	1197	**The marker gave it away. Marker 49 is at the base of the hydrophone. Another reason to use markers.**
2009/05/12 21:54:43	-15.094578	-173.749071	8323	198	1	1198	We are now 35m to the SW of where we were observing. This area of venting is 35m across from NE to SW.
2009/05/12 21:55:50	-15.094575	-173.749074	8325	198	1	1198	The marker at the SW extent (hydrophone) is marker 49. We will try to deploy another at the NE extent of this venting.
2009/05/12 21:57:14	-15.094579	-173.749078	8327	197	1	1198	**RECOVER Hydrophone next to Mkr-49**. Just upslope from Hades (which we were calling Akel's Afi for the last 2.5 hours).
2009/05/12 21:58:57	-15.094586	-173.749075	8330	197	1	1198	The area of venting is close to 40 meters from SW to NE close to the spine of this incredible volcano.
2009/05/12 22:01:06	-15.094596	-173.749068	8333	196	1	1198	The marker is at the southern (SW) end of the venting site. Hades is just to the NE of us - about 5 meters.
2009/05/12 22:02:43	-15.094595	-173.749074	8337	182	1	1198	The buttcam shows come amazing action at Hades.
2009/05/12 22:05:21	-15.094580	-173.749217	8341	271	1	1201	Moving to take a sand sample in hot sediments for Anna Louise.
2009/05/12 22:07:19	-15.094467	-173.749272	8344	260	4	1210	In the buttcam we are seeing lots of flames that looks like candles on the seafloor.
2009/05/12 22:09:51	-15.094714	-173.749368	8347	138	2	1215	The active pillows are about 12 - 20 meters downslope from the fire.
2009/05/12 22:09:57	-15.094718	-173.749367	8348	140	2	1214	Rattails.
2009/05/12 22:10:46	-15.094739	-173.749384	8350	131	3	1215	Zoarcids (white vent fish) in the area. Also see some microbial mat on the seds.
2009/05/12 22:11:26	-15.094801	-173.749437	8352	111	7	1217	Seeing a congregation of white vent fish (zoarcids).
2009/05/12 22:11:36	-15.094806	-173.749438	8353	138	3	1218	Yellow staining on these pillows as well.
2009/05/12 22:17:41	-15.094670	-173.749156	8360	52	4	1201	We're now at 1207 meters. Going to get a hot sediment sample.
2009/05/12 22:19:17	-15.094598	-173.749089	8362	49	3	1198	We're N/NE of the marker. We've been traveling to the NE.
2009/05/12 22:19:21	-15.094601	-173.749087	8364	49	3	1198	Marker in sight
2009/05/12 22:19:53	-15.094631	-173.749066	8365	48	3	1197	**Marker 49** - We're back where we started
2009/05/12 22:20:32	-15.094590	-173.749030	8367	43	2	1197	**Hades in view.**
2009/05/12 22:21:03	-15.094607	-173.749008	8368	25	3	1196	We are heading more north this time.
2009/05/12 22:22:12	-15.094500	-173.749059	8370	28	4	1201	We are hoping to find Akel's Afi to take a sediment sample for microbiology.
2009/05/12 22:22:41	-15.094467	-173.749089	8372	22	5	1204	Fresh pillows in view.
2009/05/12 22:23:01	-15.094466	-173.749129	8373	25	5	1206	We are in smoke now. Looking for the vents.
2009/05/12 22:23:47	-15.094395	-173.749183	8375	25	3	1213	Still in smoke moving north-northwest.
2009/05/12 22:24:08	-15.094333	-173.749170	8376	37	4	1213	Vents off to our starboard side and above
2009/05/12 22:25:36	-15.094253	-173.749095	8379	49	2	1216	Now north of target 57
2009/05/12 22:26:06	-15.094196	-173.749078	8380	147	6	1214	Seeing lots of lava flow down hill - 10 meters long and running - in medea cam
2009/05/12 22:26:44	-15.094244	-173.749039	8382	143	6	1209	Coming upslope 10 meters north of target 57.
2009/05/12 22:27:04	-15.094243	-173.749036	8383	181	7	1207	Lots of flow contacts with sediment.
2009/05/12 22:27:12	-15.094257	-173.749026	8384	181	7	1206	Fresh lava.
2009/05/12 22:27:43	-15.094311	-173.749020	8386	186	7	1202	Pillows broken as we climb the slope.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 22:27:58	-15.094321	-173.749019	8387	185	7	1200	Active pillow growth in distance on slope.
2009/05/12 22:28:16	-15.094323	-173.748999	8388	182	8	1199	Black lava downslope.
2009/05/12 22:29:01	-15.094296	-173.748960	8390	181	6	1201	Chatting about where to find warm sediments for ALR.
2009/05/12 22:30:09	-15.094288	-173.748906	8392	147	5	1200	Flow contact like a river of lava.
2009/05/12 22:30:20	-15.094296	-173.748902	8394	156	6	1200	No shrimp.
2009/05/12 22:30:37	-15.094309	-173.748904	8395	188	8	1196	Great lava contact!
2009/05/12 22:30:50	-15.094324	-173.748895	8396	188	6	1196	Still steaming on the margins.
2009/05/12 22:31:53	-15.094378	-173.748908	8398	192	6	1193	Great shot of explosions back at a vent- Hades target is 50 m. Saw it from here.
2009/05/12 22:33:03	-15.094387	-173.748926	8400	192	6	1192	Set up to do more video at what we think is this most northeastern vent.
2009/05/12 22:33:34	-15.094380	-173.748936	8402	192	7	1192	There are no targets northeast of here.
2009/05/12 22:33:49	-15.094393	-173.748935	8403	192	6	1192	Putting a **target** here - Calling it "**northeast vent**"
2009/05/12 22:35:04	-15.094384	-173.748955	8405	198	6	1192	Latitude 15 5.664 173 44.936W
2009/05/12 22:36:22	-15.094368	-173.748950	8408	200	6	1193	Turning the iris down to image vent.
2009/05/12 22:36:32	-15.094367	-173.748950	8409	200	6	1193	Collecting video images.
2009/05/12 22:37:54	-15.094344	-173.748934	8411	202	7	1193	Still taking video.
2009/05/12 22:40:44	-15.094351	-173.748937	8415	200	8	1191	**Observing Hades eruptive cycle.**
2009/05/12 22:41:14	-15.094380	-173.748920	8416	201	9	1191	Pillow forming and moving down slope.
2009/05/12 22:42:06	-15.094383	-173.748921	8418	200	9	1191	Large eruptive events throwing rock and tephra into the water column.
2009/05/12 22:44:06	-15.094377	-173.748912	8421	200	9	1191	This looks exactly like where we were before.
2009/05/12 22:44:14	-15.094375	-173.748911	8422	200	9	1191	That was a lateral burst.
2009/05/12 22:44:35	-15.094371	-173.748911	8424	200	9	1191	We get a lot of detail in the bubble burst.
2009/05/12 22:45:29	-15.094349	-173.748921	8426	200	9	1190	Not sure if we are looking at exactly the same orifice.
2009/05/12 22:45:45	-15.094341	-173.748927	8427	200	9	1191	Clague made them turn the iris down.
2009/05/12 22:46:01	-15.094331	-173.748934	8428	200	9	1190	It's a bit dark.
2009/05/12 22:46:05	-15.094329	-173.748936	8429	200	9	1190	Actually quite dark.
2009/05/12 22:46:21	-15.094337	-173.748933	8431	198	8	1191	Looking at explosive eruptions.
2009/05/12 22:46:34	-15.094327	-173.748942	8432	198	12	1190	Another vent to the starboard side of us.
2009/05/12 22:46:46	-15.094333	-173.748936	8433	197	15	1190	See pillows forming in the brow cam.
2009/05/12 22:47:32	-15.094306	-173.748967	8435	200	25	1193	NAV Lost bottom lock.
2009/05/12 22:47:38	-15.094308	-173.748964	8436	183	24	1194	Doppler out.
2009/05/12 22:49:20	-15.094389	-173.748976	8439	138	13	1192	Seeing big tons of ash.
2009/05/12 22:49:58	-15.094369	-173.749002	8440	139	14	1193	In this case because the it's fairly thick the rinds are what Clague would call "spatter".
2009/05/12 22:50:25	-15.094366	-173.749007	8442	139	15	1193	This whole area is so dynamic.
2009/05/12 22:50:49	-15.094367	-173.749009	8443	139	15	1193	Part of the discussion that is going on is about what we are seeing.
2009/05/12 22:51:06	-15.094371	-173.749008	8444	139	15	1193	We have a little avalanche that happened downslope from us.
2009/05/12 22:51:36	-15.094377	-173.749005	8446	139	15	1193	Will thinks that it is a sheet flow right beneath us. See linear cracks.
2009/05/12 22:51:47	-15.094379	-173.749004	8447	139	15	1193	Raised a big messy cloud.
2009/05/12 22:52:32	-15.094388	-173.749000	8449	139	15	1193	Clague and Susan think that it is the same place that we had been.
2009/05/12 22:52:59	-15.094392	-173.749001	8450	139	15	1193	That looked like a burp of lava that cooled and collapsed.
2009/05/12 22:53:39	-15.094398	-173.749005	8452	140	16	1193	The melt expanding is orange and then we get these big plumes.
2009/05/12 22:58:14	-15.094378	-173.748983	8457	143	13	1193	Wow we now are looking to the SW (port of the other vent). Our heading is 143 degrees. We are in the area of Mkr-49.
2009/05/12 22:58:51	-15.094374	-173.748982	8459	143	13	1193	**We're in the area of target 58 which was to the N/NE of Mkr-49. Our depth is 1194 right now.**
2009/05/12 23:01:07	-15.094372	-173.748979	8462	141	12	1193	Wow there is a huge extrusion of lava. Coming downslope.
2009/05/12 23:02:08	-15.094401	-173.749002	8464	134	13	1193	Amazing shot of the erupting lava.
2009/05/12 23:02:36	-15.094413	-173.749005	8466	133	12	1193	Looks like a big of sulfur in the plume.

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 23:03:00	-15.094415	-173.749004	8467	129	10	1193	Seeing a lot of yellow in the plume.
2009/05/12 23:03:42	-15.094417	-173.749001	8469	123	11	1193	Lots of flames.
2009/05/12 23:03:54	-15.094416	-173.749000	8470	123	10	1193	The audio doesn't seem to be working.
2009/05/12 23:05:06	-15.094406	-173.748992	8472	125	10	1193	It's incredible to believe that there are several cones erupting at this level.
2009/05/12 23:05:22	-15.094404	-173.748989	8474	118	8	1193	Seeing lots of flame (magma) bursts.
2009/05/12 23:05:43	-15.094403	-173.748987	8475	120	8	1193	Lava bombs falling out of the plume.
2009/05/12 23:06:29	-15.094394	-173.748991	8477	122	12	1193	We're sitting about 4 meters away from the eruptions.
2009/05/12 23:08:03	-15.094416	-173.748993	8479	124	12	1193	The debate about what we are seeing is STILL going on.....
2009/05/12 23:08:32	-15.094424	-173.749002	8481	124	11	1193	The flow is extending behind us.
2009/05/12 23:08:44	-15.094422	-173.749009	8482	127	13	1193	We're going to follow the flow front back down again.
2009/05/12 23:08:51	-15.094419	-173.749012	8483	126	15	1194	Brought the iris back up on the camera.
2009/05/12 23:10:03	-15.094374	-173.749087	8485	134	14	1203	Massive lavas flowing down hill here.
2009/05/12 23:10:16	-15.094368	-173.749106	8486	134	11	1206	The lava flow is quite far below the vehicle.
2009/05/12 23:10:35	-15.094362	-173.749127	8488	134	13	1207	We're in a dangerous spot here. Can't see much.
2009/05/12 23:11:42	-15.094307	-173.749207	8490	142	6	1219	The microphone is working again. No idea how long it hasn't been on.
2009/05/12 23:12:03	-15.094303	-173.749222	8491	144	9	1220	MICROPHONE IS BACK ON - DON'T KNOW HOW LONG THE BATTERY HAS BEEN OUT.
2009/05/12 23:12:16	-15.094301	-173.749230	8492	144	11	1219	No visibility. Depth is 1220m.
2009/05/12 23:13:10	-15.094348	-173.749235	8494	136	10	1213	Still no doppler lock and no visual reference. Jason is coming up a bit.
2009/05/12 23:25:20	-15.094323	-173.748975	8508	187	10	1195	Big chunks falling off the erupting vent.
2009/05/12 23:27:17	-15.094307	-173.748910	8510	187	10	1195	This is the same spot we were looking at it from earlier. New black lava has flowed over the rock that we were looking at earlier.
2009/05/12 23:29:27	-15.094270	-173.748890	8514	187	12	1195	Fresh pillow trail over the whiter rock in the front of the view.
2009/05/12 23:30:38	-15.094344	-173.748923	8516	188	8	1195	The vent is still throwing out lava blocks.
2009/05/12 23:31:14	-15.094340	-173.748926	8517	187	8	1195	We're going to dial down the iris a bit.
2009/05/12 23:31:45	-15.094336	-173.748928	8519	187	8	1195	Bursts of fire (glowing magma).
2009/05/12 23:32:30	-15.094331	-173.748927	8521	187	8	1195	Almost continual bursts. Lightening-red flashes.
2009/05/12 23:33:30	-15.094331	-173.748923	8523	187	8	1195	The white particles here are almost all elemental sulfur.
2009/05/12 23:33:47	-15.094332	-173.748922	8524	187	8	1195	There is H2S here.
2009/05/12 23:34:50	-15.094345	-173.748921	8526	187	8	1195	The phenocrysts that we saw in the plume can send the phenocrysts right up into the plume. Could indicate this type of eruption.
2009/05/12 23:35:05	-15.094337	-173.748931	8527	188	9	1195	Pillow lava flowing down slope. Nice footage here.
2009/05/12 23:35:25	-15.094335	-173.748940	8529	188	8	1195	Watching this pillow flow downslope.
2009/05/12 23:35:48	-15.094329	-173.748953	8530	188	10	1195	Amazing image in the brow cam of the lavas flowing downslope.
2009/05/12 23:37:13	-15.094314	-173.748975	8532	188	9	1198	Unreal sitting here watching these pillows trail down the slope.
2009/05/12 23:39:09	-15.094317	-173.748986	8535	188	9	1199	Going to try to poke the molten lava.
2009/05/12 23:40:25	-15.094314	-173.749002	8538	187	6	1200	We're about to collect molten lava on the "poking stick".
2009/05/12 23:41:21	-15.094313	-173.749010	8540	181	2	1203	The whole surface is moving and advancing.
2009/05/12 23:42:14	-15.094316	-173.749004	8541	149	3	1203	Poked the lava but it wouldn't cling to the stick.
2009/05/12 23:42:43	-15.094318	-173.749002	8543	137	3	1203	Poking the stick in the glowing lava.
2009/05/12 23:42:52	-15.094321	-173.749003	8544	138	5	1202	The crust is pretty thin.
2009/05/12 23:42:59	-15.094319	-173.749002	8545	129	7	1201	Here comes another one.
2009/05/12 23:44:21	-15.094258	-173.748978	8548	169	14	1199	Bending the probe to try to get lava to stick to it.
2009/05/12 23:46:08	-15.094242	-173.748959	8550	210	11	1201	Will turn the probe around and try to poke into the glowing pillow as it creeps down slope.
2009/05/12 23:50:18	-15.094420	-173.748908	8555	220	7	1191	SAMPLE Geology **J420-molten-lava-23**. Poked the T-probe into a glowing advancing pillow and got a large bit of molten lava that hardened immediately. **[downslope from Hades]**
2009/05/12 23:51:26	-15.094370	-173.748902	8558	202	8	1191	J420-molten-lava-23. Looks like we were about 5m downslope. Z=1197. Amazing sample!

time stamp	vv lat	vv long	vv rec	hdg	alt	jasZ	J420 log comments (West Mata)
2009/05/12 23:52:38	-15.094384	-173.748928	8560	189	4	1194	**It's just one big mound with several exploding erupting vents here on this mound that we are calling Hades area.**
2009/05/12 23:53:52	-15.094420	-173.748940	8562	190	2	1194	Used a titanium rod to poke the lava.
2009/05/12 23:54:40	-15.094424	-173.748937	8564	196	4	1194	Amazing bursts of magma.
2009/05/12 23:55:01	-15.094433	-173.748950	8565	196	2	1194	Flashes of red that look like lightning.
2009/05/12 23:55:22	-15.094430	-173.748954	8567	196	2	1194	Flat pieces are part of the bubble wall.
2009/05/12 23:57:29	-15.094384	-173.748950	8570	196	3	1195	The whole side is falling down slope can see it in the brow cam.
2009/05/12 23:58:17	-15.094403	-173.748962	8571	191	2	1194	This is the most spectacular thing that any of us have seen on the seafloor.
2009/05/12 23:59:25	-15.094403	-173.748954	8574	202	1	1195	One last show.
2009/05/13 00:00:35	-15.094396	-173.748948	8576	200	5	1193	Pieces of the bubble shells are raining down.
2009/05/13 00:01:49	-15.094294	-173.748908	8578	131	19	1188	Pulling away from the seafloor to do a bit of basket management.
2009/05/13 00:02:15	-15.094314	-173.748903	8579	154	18	1186	Brief glimpse of the vents from up above.
2009/05/13 00:04:52						1154	Killing the video and heading up.
2009/05/13 00:59:57						2	Medea on deck.
2009/05/13 01:06:20						1	JASON on deck