



Transforming Remotely Conducted Research using Education Ethnography & Rapidly Evolving Technologies



The INSPIRE Program

Integrated NSF Support Promoting Interdisciplinary
Research & Education

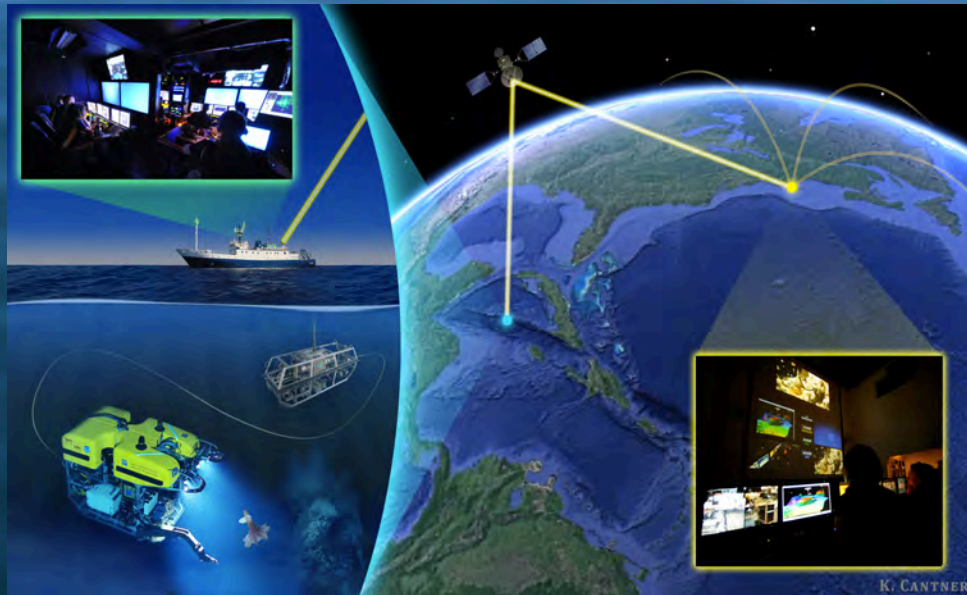
This Project Spans 3 NSF Directorates:
Ocean Sciences (OCE)
Education & Human Resources (EHR)
Computer & Information Science & Engineering (CISE)



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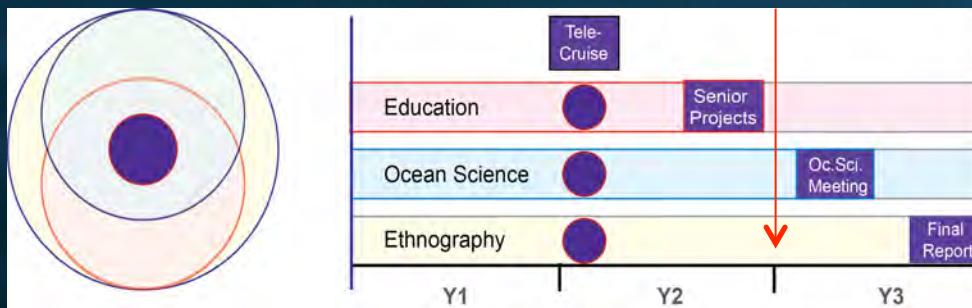
What *WERE* We Thinking???



Goal: 2013 showed we *could* connect a UNOLS ship to shore via Telepresence. But *should* we? How can we use telepresence better, to facilitate active remote participation in research and undergraduate teaching.

Concept: A telepresence-enabled cruise nested within *Ocean Science* research that also forms a basis for research into *Educational* methods and *Ethnography*.

Motivation: Telepresence is not a “normal” way for working in the oceans and, on their own, oceanographers are not the best people to work out what the “new normal” should be. But ships keep shrinking so anything that can relieve demand for science berths is worth trying.





Transforming Remotely Conducted Research The NSF-INSPIRE “TREET” Partnership



Co-PIs:

Amy Pallant (Concord): Education Katy Croff Bell (OET): Ocean-Telepresence
Sheila Jasanoff & Zara Mirmalek (HKS): Ethnography Kanna Rajan: (JPL/MBARI): Robotics

Mentors:

Steve Carey (URI): Geology Cindy Van Dover (DUML): Biology

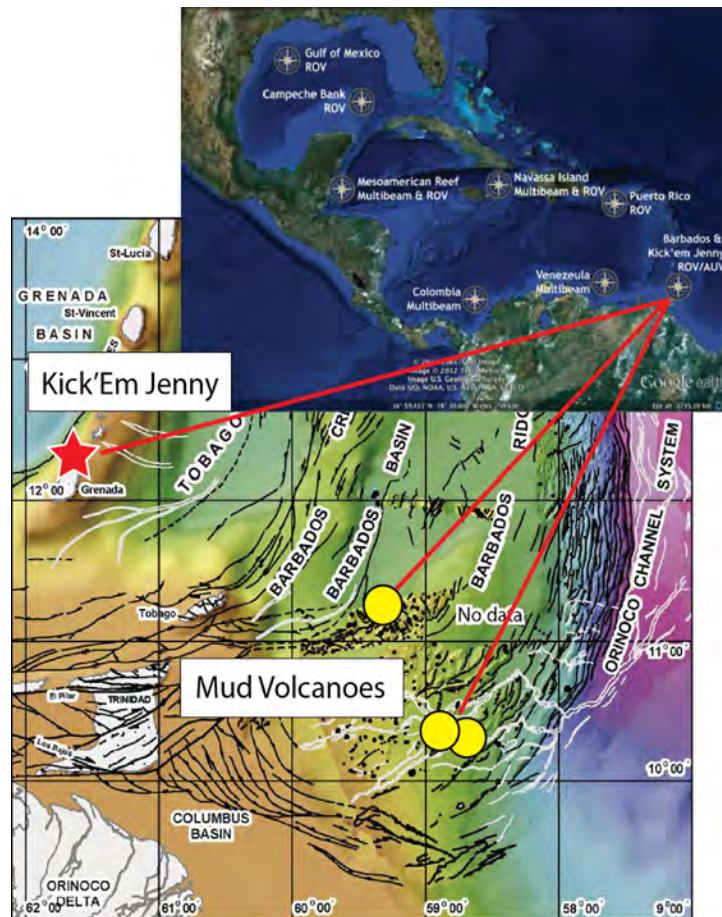
Early Career Scientists:

Eric Mittlestaedt (U.Idaho) Anna Michel (WHOI) Scott Wankel (WHOI)
Masako Tominaga (Michigan State) Chris Roman (URI) Pete Girguis (Harvard)





Transforming Remotely Conducted Research The Compelling Ocean Science Research Project



- Investigating the fate of CH_4 and CO_2 released to the oceans from *natural* examples of gas-rich seafloor fluid flow.
- Volcanic exhalations at Kick'em Jenny submarine volcano (Steve Carey).
- Cold Seeps at the Barbados Mud Volcanoes (Cindy Van Dover).
- Multi-disciplinary investigations using methods in geophysics, imaging, and *in situ* biogeochemical sensing.
- Nobody to be allowed on the ship!!!



Transforming Remotely Conducted Research Y1: Synchronous Winter Semester Seminar Series



13 Week Seminar Series: Mondays @ 6PM EDT

Seminar in Remote Deep Sea Research & Exploration

The spring 2014 seminar series is designed to introduce the project and provide undergraduates students with background they will need to undertake research during the second year of the project.

The seminar will provide:

- an overview of the program
- background on science and research pertinent to the sites to be studied
- an introduction to the technology and the robotic vehicles
- planning time for the research

The seminar will be held on Monday nights at 6:00 p.m. EST.

Week 1: Jan 26-31
Chris German (Co-PI), Amy Peltzer (Co-PI) and Zara Minoura (Co-PI) introduce the program as a whole, overview of ethnography, education and evolving technologies.

Week 2: Feb 3-7
Katy Croff-Bell (Co-PI), Steve Canary and Cindy Lee Yeh Dover, provide overview of technology and scientific research opportunities.

Week 3: Feb 10-14
Michigan State University (Missako Tomiyama)

Week 4: Feb 17-21
Harvard University (Peter Girguis)

Week 5: Feb 24-28
University of Idaho (Eric Minnema)

Week 6: Mar 3-7
University of Rhode Island (Chris Roman)

Week 7: Mar 10-14
Woods Hole Oceanographic Institute early career scientist (Ariela Michel and Scott Weisler)

Week 8: Mar 17-21 Spring Break (No Zoom session)

Week 9: Mar 24-28
Feasibility discussion: Discuss your research ideas with scientists and other students. Get ideas about tools and techniques.

Weeks 10-11: Mar 31 - Apr 11 (Presentations March 31 and April 7)
Student presentations of research goals.

Week 12: Apr 14-18
Moving toward a plan for the cruise
Chris German and Katy Croff-Bell to present plan for the cruise that is feasible, available, get feedback from group.

Week 13 (TBD)
Finalizing the plan (timing to be determined)
Chris German will explain final plan for the cruise.

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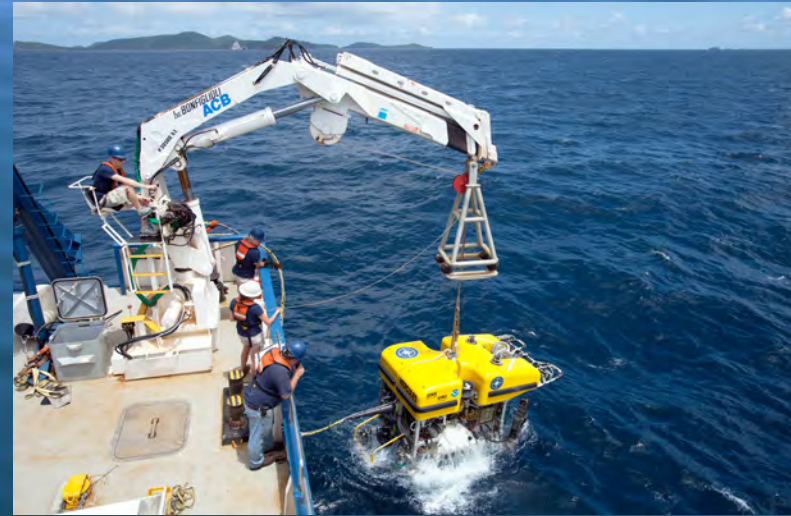
Topics Covered:

Introduction to the Technology
Lectures on the Mentors' Interests
Presentation of Student Projects

Introduction to the Field Areas
Lectures on the ECS PIs' Interests
Detailed Pre-Cruise Planning



Transforming Remotely Conducted Research Y2: The TREET Cruise At Sea



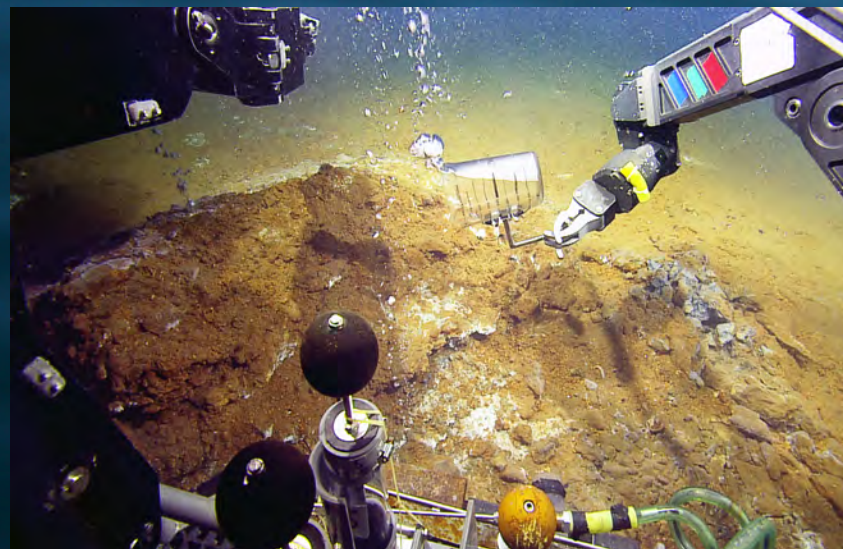


Transforming Remotely Conducted Research Y2: The TREET Cruise On-Shore



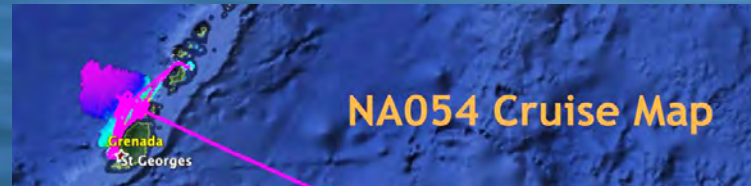


Transforming Remotely Conducted Research 3 Weeks, 17 Dives, All Project Data Collected





Transforming Remotely Conducted Research 3 Weeks, 17 Dives, All Project Data Collected

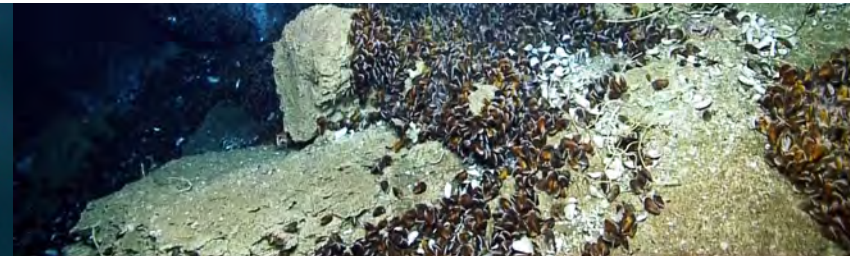


Objectives to get a Passing/Worthwhile Grade for all our "Volunteer" Science Participants (ECS & Students)

Data Needs:		Chris R	Eric	Pete	Scott	Anna	Masako	Carly	Cody	Laney	Tyler	Silas	Taylor	Alex
Locale	Science Operations													
KEJ Crater	Detailed mapping in KEJ Crater	✓						✓	✓					
	Photo-mosaic in KEJ Crater	✓						✓	✓					
	Magnetic Survey of KEJ						✓			✓				
	Laser Spec at somewhere/anywhere			✓	✓	✓								
	Fluid flow somewhere/anywhere		✓											
	Bubble flow in KEJ	✓												
KEJ Flanks	Geology/fluids outside KEJ crater											✓		
	Dive-based studies of KEJ flank										✓			
KEJ Seeps	Animal photos at KEJ seeps													✓
	Laser spec at KEJ seeps													✗
BMV Seeps	Laser spec at BMV												✗	
	Bubble & fluid flow at BMV	✓	✓									✓		

Updated 28-Sep

Key	Color	Status
	Green	Achieved
	Yellow	Attempted
	Orange	To Be Done
	Red	Not Done





Transforming Remotely Conducted Research Y2: Synchronous Spring Semester Seminar Series



5 Week Series: Thurs @ 6PM EDT (Midnight in Germany!!!)

Ocean Science Research Updates from each Laboratory:

April 2nd: WHOI April 9th: URI (Roman/Carey) April 16th Harvard
April 23rd: Michigan State April 30th: U.Idaho





Transforming Remotely Conducted Research Y3: Long Term Outcomes from the Project



1. Work up of the **Educational Research** data-sets:
 - presentation to DESSC in Dec 2015
 - publication in peer-review literature in 2016
2. Work up of the **Ethnography Research** data-sets:
 - presentation to DESSC in Dec 2015
 - publication in peer-review literature in 2016
3. Special session on **Telepresence-enabled** Ocean Science and Exploration at Ocean Sciences Meeting, March 2016
(Co-Chairs: German, Demopoulos, Bell, Raineault)