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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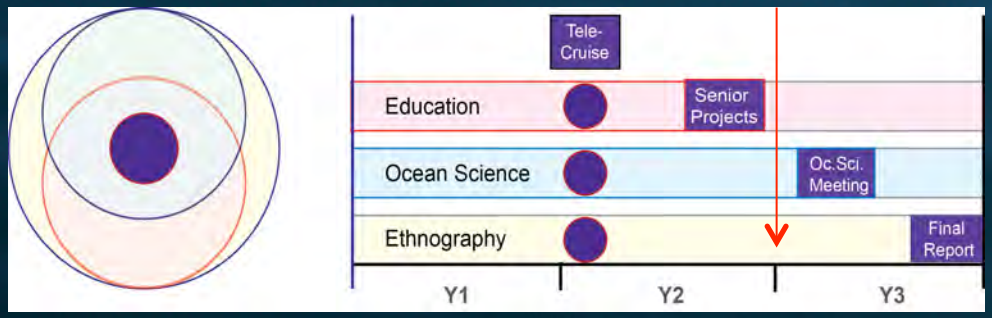
What *WERE* We Thinking???



Goal: 2013 showed we *could* connect a UNOLS ship to shore via Telepresence. But *should* we? How can we use tele-presence 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

The Concord Consortium

OCEAN EXPLORATION TRUST

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)

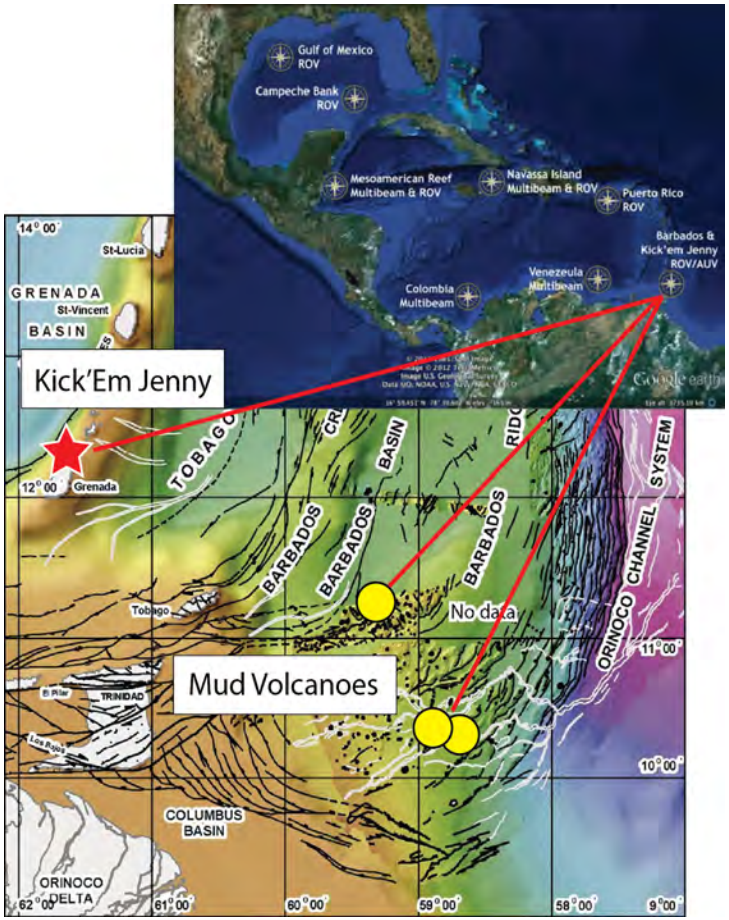
Scott Wankel (WHOI)

Masako Tominaga (Michigan State)

Chris Roman (URI)

Pete Girguis (Harvard)

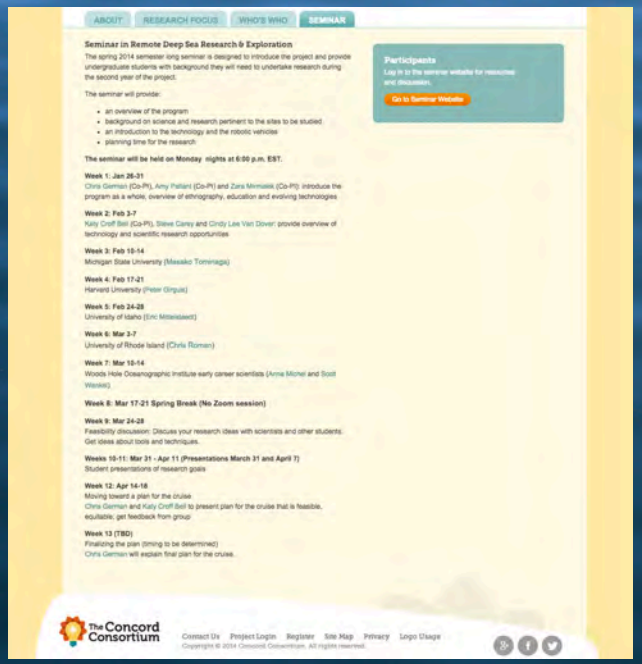
Transforming Remotely Conducted Research
The Compelling Ocean Science Research Project



- 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



Topics Covered:

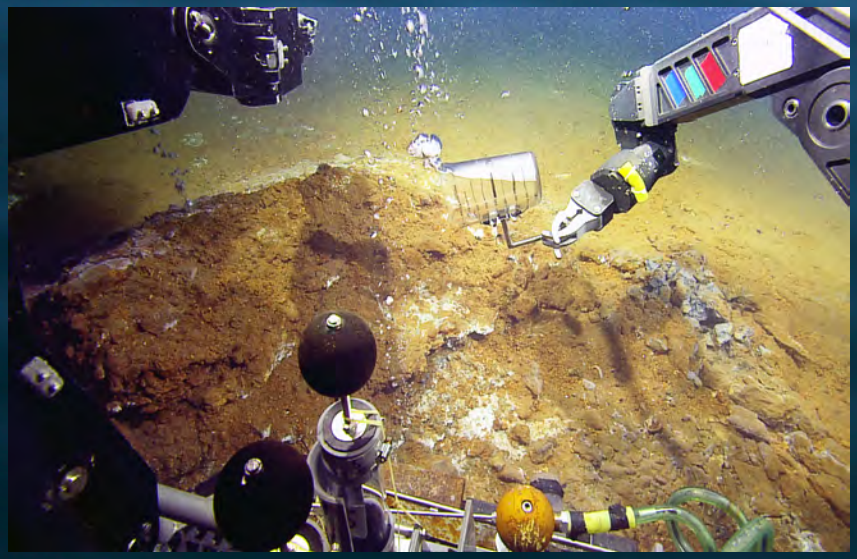
Introduction to the Technology
Lectures on the Mentors' Interests
Presentation of Student Projects

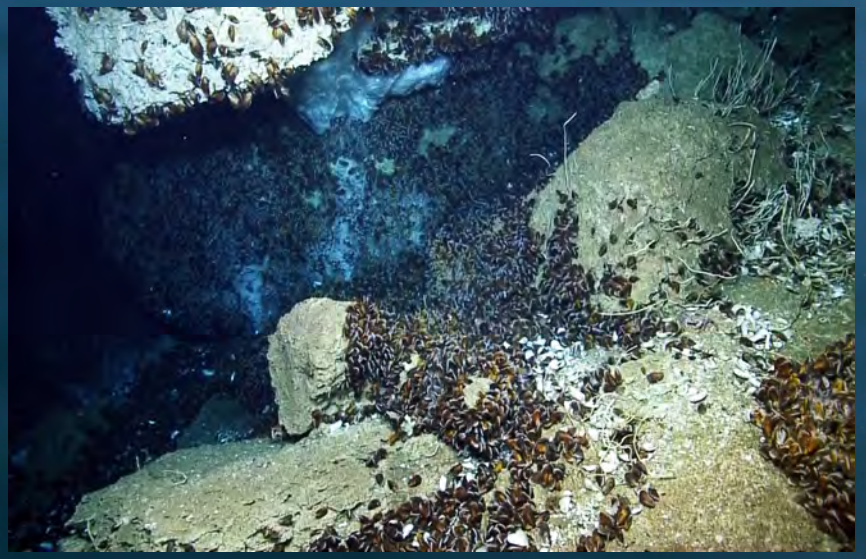
Introduction to the Field Areas
Lectures on the ECS PIs' Interests
Detailed Pre-Cruise Planning

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
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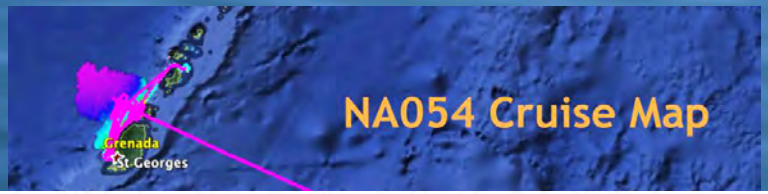


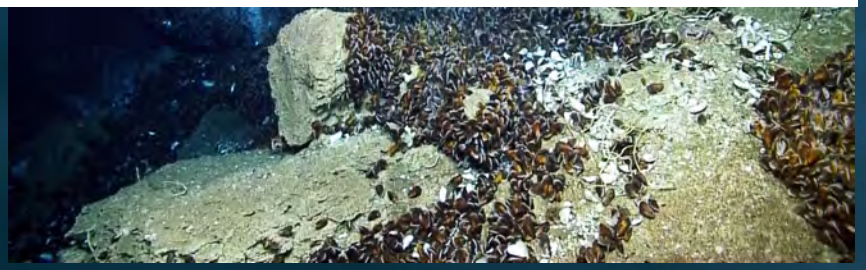
Objectives to get a Passing/Worthwhile Grade for all our "Volunteer" Science Participants (ECS & Students)

Locale	Science Operations	Data Needs: Chris R	Eric	Pete	Scott	Anna	Masako	Carly	Cody	Laney	Tyler	Silas	Taylor	Alex
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													x
BMV Seeps	Laser spec at BMV												x	
	Bubble & fluid flow at BMV	√	√										√	

Updated 28-Sep

Key

- Achieved
- Attempted
- To Be Done
- 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)