

NOAA Report 2012

Deep Submergence Science Committee Meeting June 13, 2012

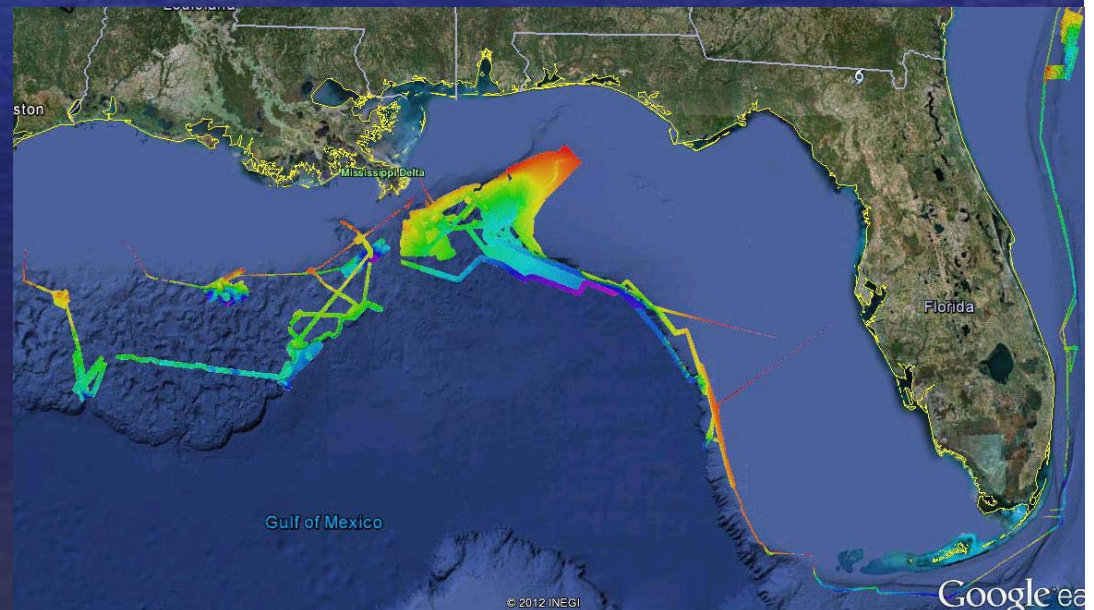


Catalina Martinez, NOAA OER
LTJG Brian Kennedy, NOAA OER



Okeanos Explorer 2012 Field Season: Ongoing

- 8 Legs all within US EEZ
- ~80,000 km² mapped so far
- 29 ROV Dives completed in GOM
- 13 AUV dives planned for July
- Strengthening partnerships





Okeanos Explorer
EX 1202 L3
Shipwrecks
Gulf of Mexico



**19th Century Shipwreck Discovered
In Gulf Of Mexico (PHOTOS)**

Posted: 05/17/2012 6:50 pm Updated: 05/31/2012 2:36 pm

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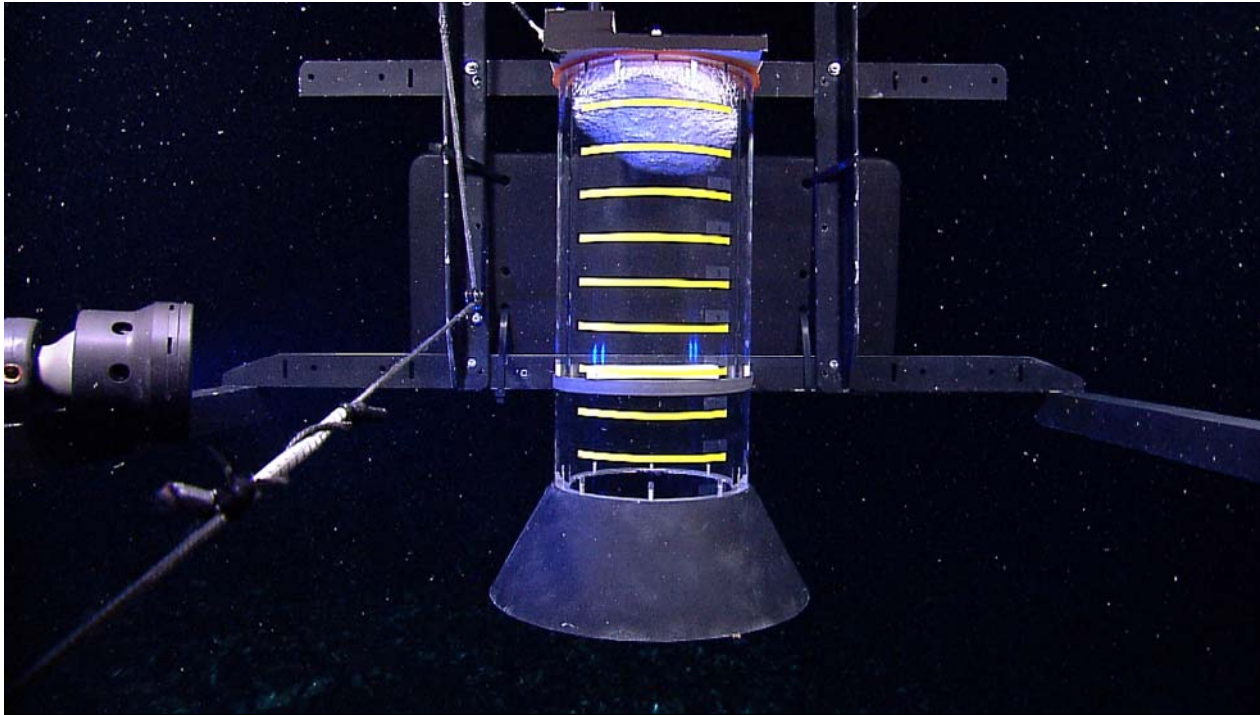


19th Century Shipwreck

NOAA OKEANOS EXPLORER
May 17, 2012

00:04 01:26

The Weather Channel



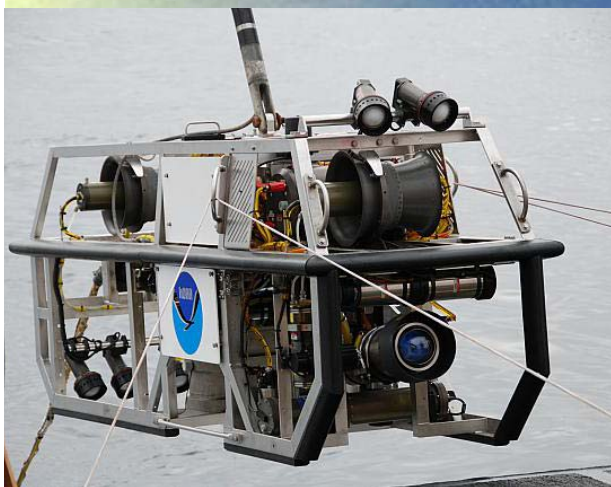
Okeanos Explorer
EX 1202 L3
Methane Seeps
Gulf of Mexico



EX Vehicles

2011 - 2012

2013 Field Season



**NOAA OER
Camera Sled *Seirios***



IFE ROV *Little Hercules*

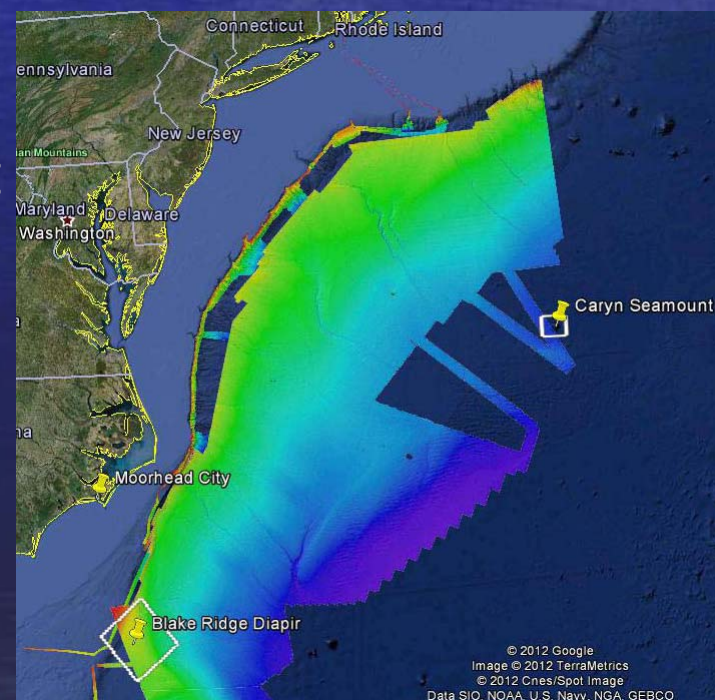


NOAA OER ROV

EX1205-L1

Exploration & Testing with Sentry


- July 5-25
- PI's: Cindy Van Dover & Carl Kaiser
- AUV/telepresence tests
- 3 engineering dives planned on Caryn Smt
- 10 dives planned in Blake Ridge area
- Collaboration: NSF, WHOI, Duke, NOAA, URI



NOAA Ship *Okeanos Explorer* Mapping Internship Program

- Typically one 2-3 week cruise
- Over 120 applicants for 2012, for ~16 positions
- Students learn how to operate EM302 multibeam, EK60 singlebeam, & Knudsen subbottom profiler
- Data acquisition, processing, product development, special projects






Multibeam Calibration: Conducting a Patch Test

NOAA Ship *Okeanos Explorer*, February 2010

Shannon Hoy & Karma Kissinger, OER Interns 2010



What is a Patch Test?

A patch test is the systematic approach used for calibrating the various sensors used in multibeam data acquisition. There are three main sensors needed to map the bathymetry of the seafloor: the navigation sensor, attitude sensor and the echosounder (SONAR). The navigation sensor measures ship speed, heading and position. The attitude sensor measures the motion of the ship (i.e. pitch, roll, heave and yaw). The echosounder is used for transmitting and receiving sound to determine water depth and seafloor characteristics.

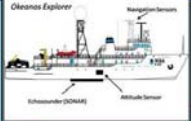

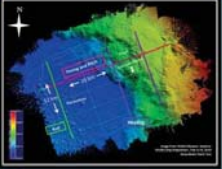
The purpose of calibration is to correct for systematic errors created by the positioning and mounting angles of the different sensors. A correctly calibrated system will show the same bathymetry in repeated tests, regardless of variables such as speed, direction and ship motion.

What a Patch Test Consists of:
















A patch test is conducted in an area of known bathymetry. An EM302 transducer (used on the *Okeanos Explorer*) performs in a wide range of depths, therefore both a shallow (500-2500 meters) and a deep (2500-4500 meters) water patch test are run. For reliability, it is preferable that the same area be used annually. A specific line plan is created to measure offsets from slight misalignment of the sensors. The plan consists of pairs of lines, each pair designated to measure its own variable.

There are four variables that are typically measured for the calibration. These are **time delay**, **pitch**, **roll** and **heading**, which must be calculated in this order. A few seafloor features are needed in the measuring of the offsets between specific sensors, including a slope, flat bottom and a discrete object (i.e. a pipe, shipwreck or rock).

Note: When conducting a patch test, it is important to eliminate sound velocity as a source of error. Therefore, a current **sound velocity profile (SVP)** should be maintained throughout the patch test.







How to Measure Variables

	Time Delay	Pitch	Roll
<p>Roll</p> 	<p>• Between navigation and SONAR sensors</p> <p>• Time is the common factor among all sensors.</p> <p>• Calibrate time first to eliminate it as a source of error while conducting the other tests.</p> <p>• Must include a 10-20° slope with a flat surface on each side.</p> <p>Setup:</p> 	<p>• Between attitude and SONAR sensors</p> <p>• Pitch can use the same coincident lines as time delay.</p> <p>• Must include a 10-20° slope with a flat surface on each side.</p> <p>Setup:</p> 	<p>• Between navigation and SONAR sensors</p> <p>• Must be conducted on a flat bottom in order to show the same offset in the port and starboard outer beams.</p> <p>Setup:</p> 
<p>Pitch</p> 	<p>• Between attitude and SONAR sensors</p> <p>• Pitch can use the same coincident lines as time delay.</p> <p>• Must include a 10-20° slope with a flat surface on each side.</p> <p>Setup:</p> 	<p>• Between attitude and SONAR sensors</p> <p>• Pitch can use the same coincident lines as time delay.</p> <p>• Must include a 10-20° slope with a flat surface on each side.</p> <p>Setup:</p> 	<p>• Between navigation and SONAR sensors</p> <p>• Requires a discrete object or slope (if no object available) in the outer beams of two separate lines.</p> <p>• Object should be centered between the two lines, and half the distance of each line.</p> <p>Setup:</p> 
<p>Yaw</p> 	<p>• Run one line twice, same speed, opposite directions.</p> <p>Results:</p> <p>• If a time delay offset is present, the position of the soundings of the slope will shift laterally with a change in speed.</p> <p>Incorrect  Correct </p>	<p>• Run one line twice, same speed, opposite directions.</p> <p>Results:</p> <p>• If a pitch offset occurs, the soundings of the slope will shift for reciprocal directions.</p> <p>Incorrect  Correct </p>	<p>• Run one line twice, same speed, opposite directions.</p> <p>Results:</p> <p>• A roll offset will be shown as a change in sounding height on the same side of the swath for each direction.</p> <p>Incorrect  Correct </p>

Results:


• If an offset is present, it will be shown as a shift in the object's position.

Incorrect  **Correct** 

Sources:

- NOAA Hydro Training Course, Pacific Hydro Branch, MBES Calibration Procedures, 2009
- NOAA Ship *Okeanos Explorer*, Standard Operations Procedures, Multibeam Patch Test SIS Calibration, 2009
- CARIS HDP's 6.1 User guide (calibration tool)

Offsets can be calculated using CARIS calibration tool or a Sea Floor Information Systems (SIS) calibration tool

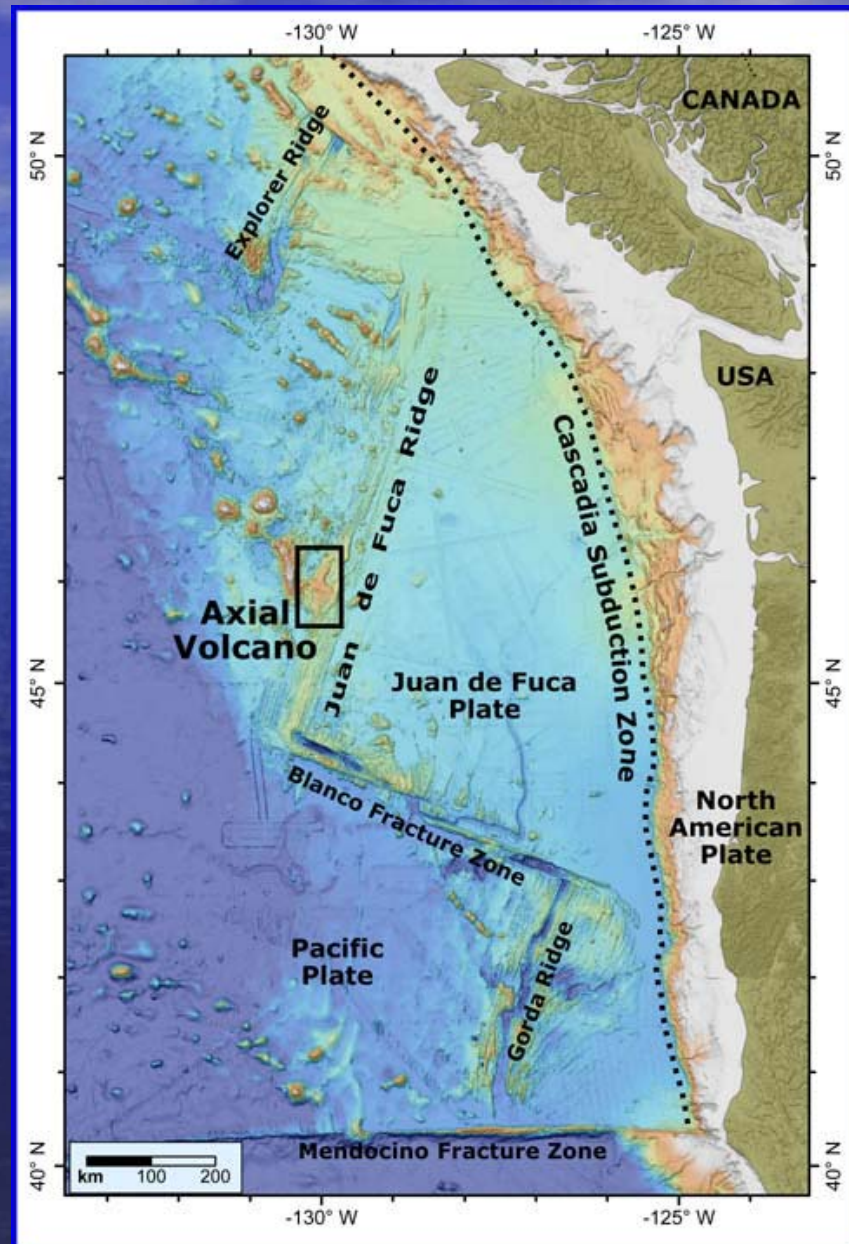


NOAA Ship *Okeanos Explorer* 2013

- DRAFT Fleet Allocation Plan 150 DAS
- North Atlantic/Caribbean/GOM
- OER ROV integration
- Mapping

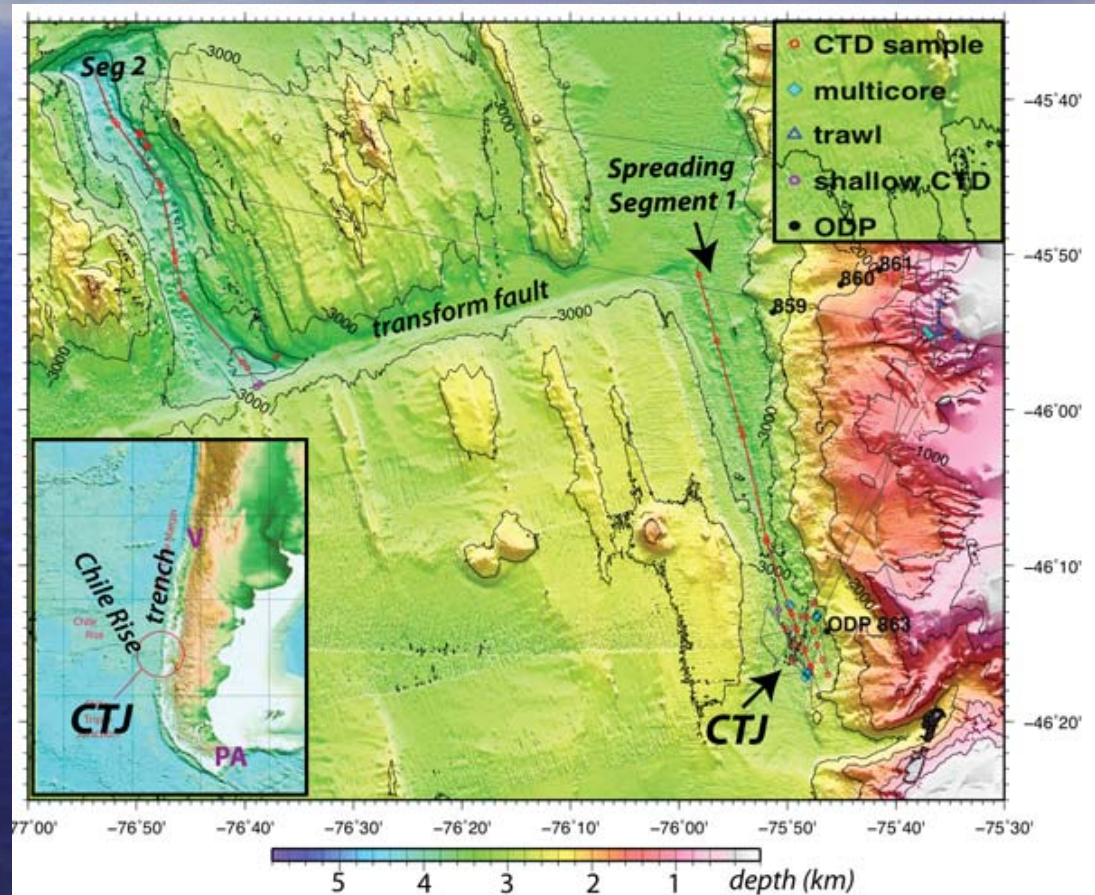
PMEL NeMO Project 2012

- August 15-27 2012
- PI's: David Butterfield & Bill Chadwick
- R/V *Thompson* with Jason
- Long-term time series chemistry and microbiology
- Geodetic and seismo-acoustic monitoring



INSPIRE: Chile Margin 2012

- April 21 -30
- PI's: Donna Blackman & Chris German
- R/V *Melville* with Sentry & Towcam
- Follow up to the INSPIRE: Chile Margin 2010 Cruise



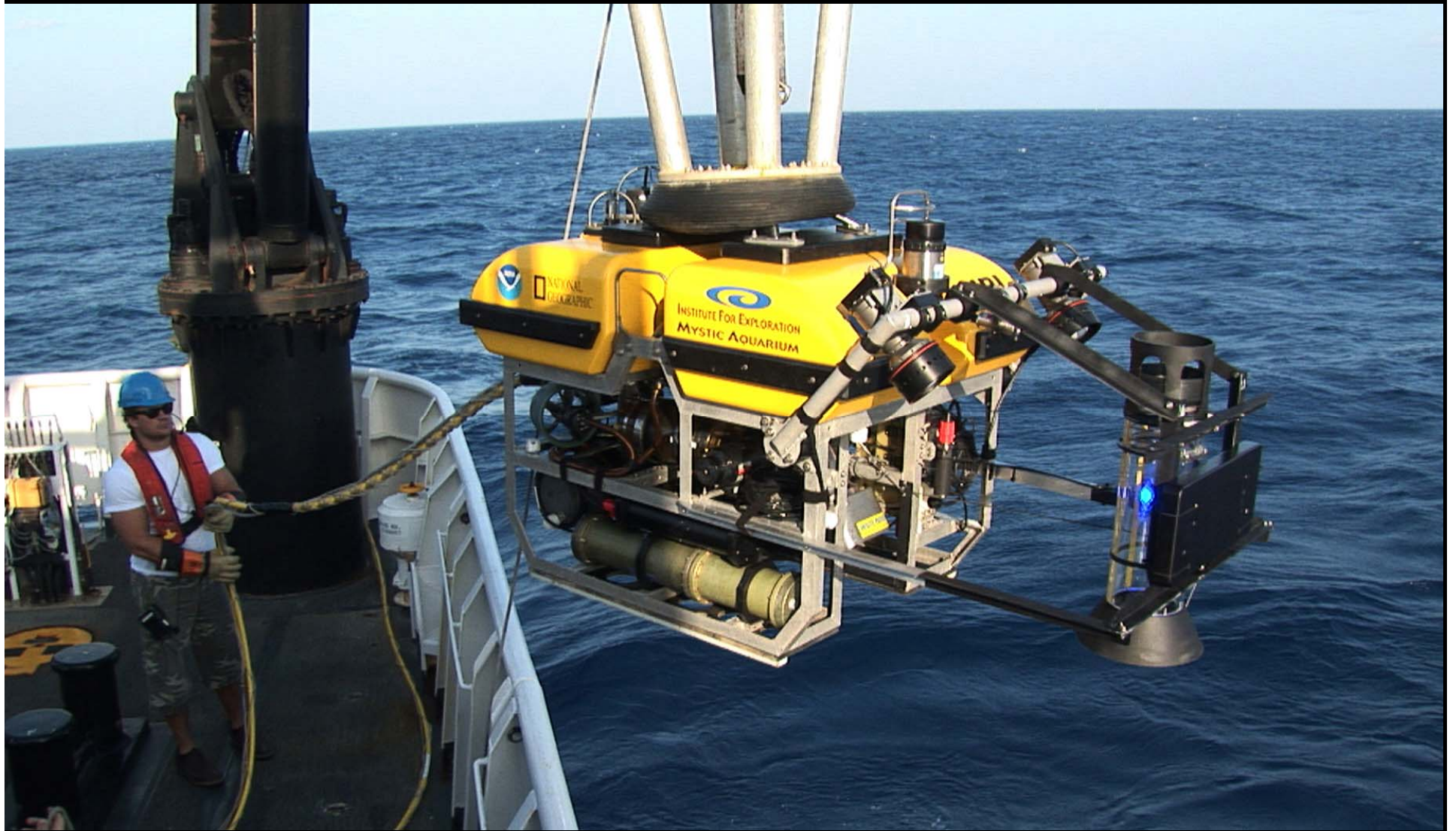
10 Year NOAA OER Program Review

- May 7-8, 2012
- Evaluated by program themes:
 - Targeted Exploration
 - Systematic Telepresence-enabled Exploration
 - Extended Continental Shelf Mapping Initiative
 - Baseline Characterization of Potential U.S. Deep-water Lease Blocks
 - Information and Data Management, and Product Development
 - Engaging the Public through Education and Outreach

<http://explore.noaa.gov/about-oer/>

FY 13 President's Budget NOAA

- \$19.7 Million for OER
- Eliminates funding for NURP



OER Program Reviewers

- Jesse H. Ausubel-Rockefeller University
- Dr. Susan K. Avery-WHOI
- Dr. Rodey Batiza- NSF
- Dr. James Delgado-NOAA
- Vice ADRM (ret) Paul G. Gaffney- Monmouth University
- Terry Garcia- National Geographic
- Cameron Hume-Former US Ambassador to Indonesia
- Dr. Jeff Karson- Syracuse University
- Dr. James Kendall- BOEM
- Dr. Eric Lindstrom- NASA
- Dr. Marica McNutt- USGS
- Jean May-Brett- Louisiana DOE
- Dr. Steve Ramberg- NDU