R/V *Marcus G. Langseth*

IRIS Webinar – October 29, 2014
L-DEO Office of Marine Operations

Lamont-Doherty Earth Observatory
Columbia University | Earth Institute

R/V Langseth - National Facility

The R/V Marcus G. Langseth joined the U.S. academic fleet in 2008 and serves as an oceanographic research vessel, with special focus on marine seismic profiling. The Langseth is owned by NSF and operated by Columbia University's Lamont-Doherty Earth Observatory under a cooperative agreement.

The Langseth is distinct among ships in the academic fleet in that it is a designated **National Facility**. This status highlights the Langseth's key role in serving a broad community by providing a unique capability to image beneath the oceans. Unlike other ships in the fleet, the Langseth is overseen by an oversight panel, the Marcus Langseth Science Oversight Committee (MLSOC), which consists of scientists from the community and serves as a liaison between the science community, the facility operator, and the NSF.

With the R/V Langseth facility, the academic community has its first fully capable 3D seismic vessel. 3D seismic reflection imaging provides a view of the Earth's interior that is unmatched in clarity, quality, and detail by any other method. In addition to the new 3D capabilities, the Langseth facility offers advancement to 2D imaging, both for reflection imaging and for sourcing wide-angle surveys using ocean-bottom seismometers and onshore instruments. Owing to an exceptional source array and longer cables, the Langseth can collect 2D data that penetrates deeper and with greater clarity than ever before.

Science Community and Programs Supported

In addition to supporting investigator-driven science on these scientific themes, the seismic imaging tool undergirds many U.S. and international science initiatives, including:

- IODP, the Integrated Ocean Drilling Program
- GeoPRISMS (the MARGINS successor program)
- R2K (the RIDGE 2000 initiative)
- Continental Dynamics
- The Ocean Bottom Seismometer Instrument Pool
- IRIS/PASSCAL, including EarthScope

R/V Langseth - Capabilities

Facility Capabilities

The Langseth facility provides a unique combination of capabilities for imaging the ocean, the seafloor, and the solid Earth beneath the sea — as well as general oceanographic instrumentation.

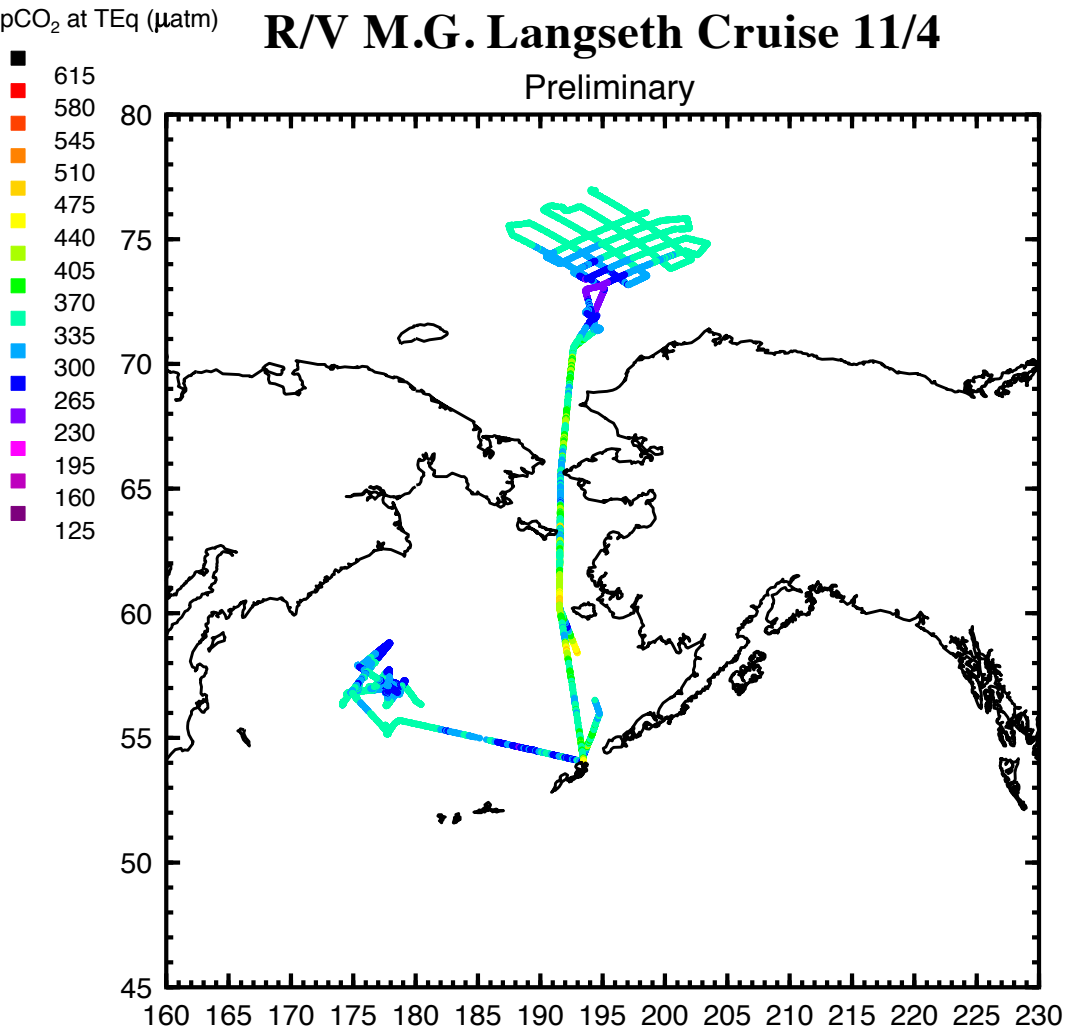
Current shipboard equipment includes:

- 3D seismic capability: including four 6-km-long hydrophone streamers and dual airgun source
- Long-offset capability, with possibility of towing up to an 8-km-long streamer in 2D mode
- Tuned, linear source array, consisting of up to 36 airguns with a total capacity of 6600 cu. in.
- Kongsberg EM122 multibeam sonar system for seafloor mapping
- Knudsen 3260 Sub-Bottom Profiling
- RDI 75 kHZ acoustic doppler current profiler (ADCP) to measure ocean currents
- Seabird thermosalinograph to measure seawater temperature and salinity
- Sippican expendable bathythermograph (XBT) launcher
- Bell BGM-3 gravimeter
- Towed Geometrics 882 magnetometer to measure gravity and magnetic fields
- Uncontaminated Seawater System for other measurements like underway pCO2

R/V Langseth - Main Lab

Langseth – 3rd Party Support

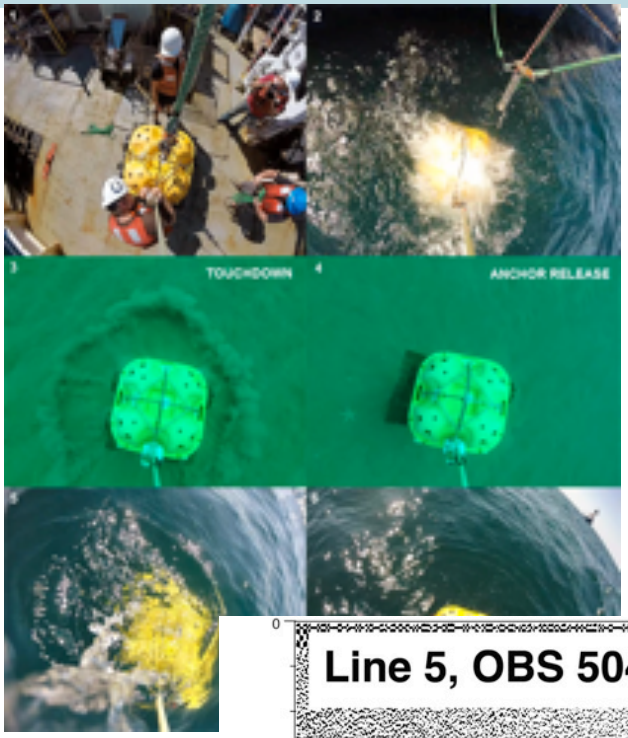
Chukchi Sea – Coakley

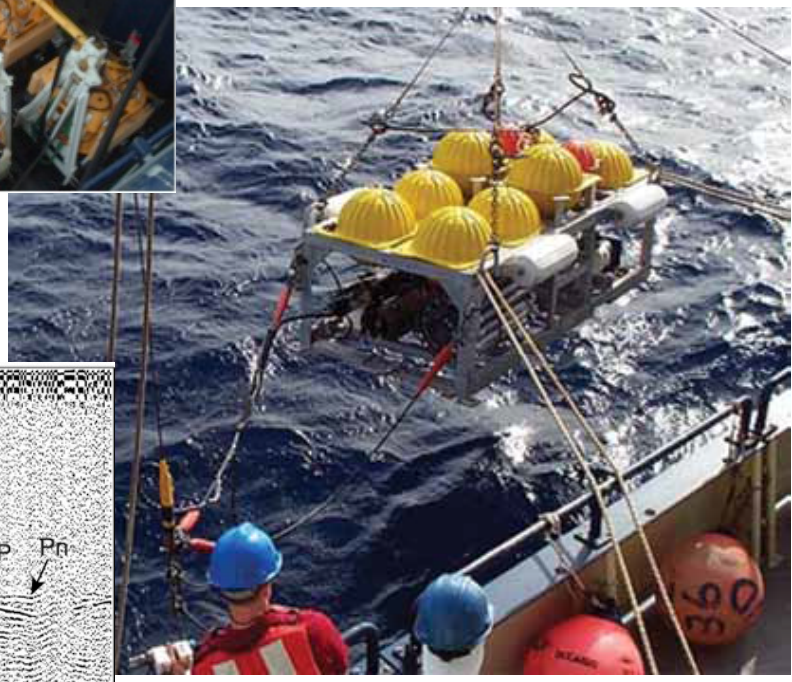


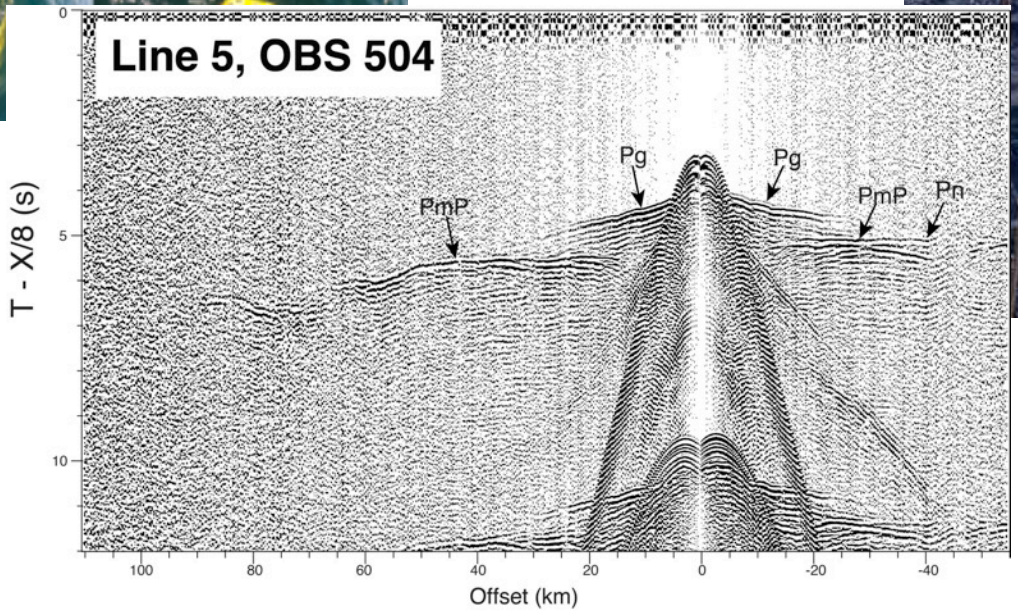
Preliminary pCO2 Data courtesy of T. Takahashi

Processed multibeam data, showing iceberg gouges on the Chukchi Shelf. The depths are color-coded: Blue is deep and red is shallow. (Coakley, NY Times – Scientist@Work blog)

Ocean Bottom Seismometers







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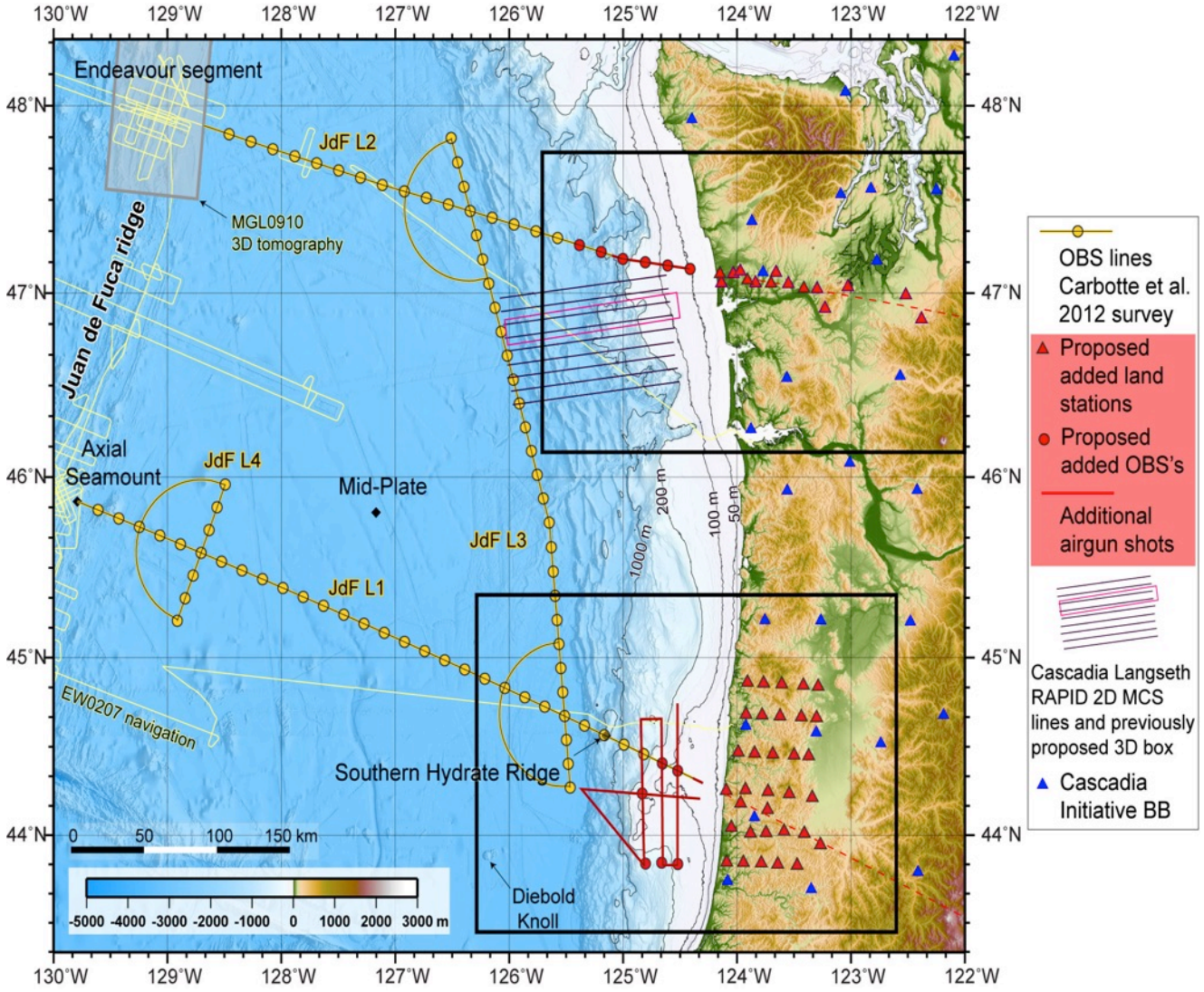
Imaging the Juan de Fuca Plate



Environmental Compliance

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Final

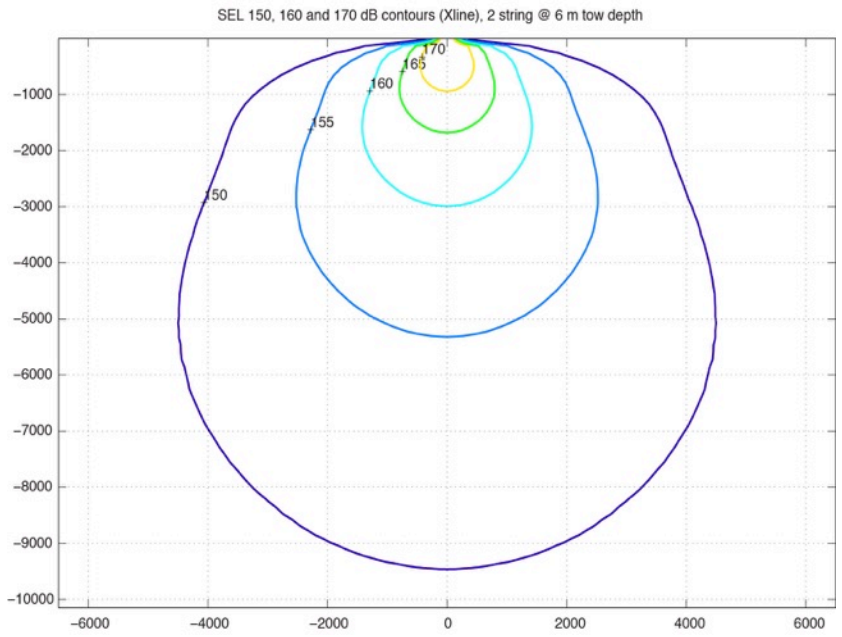
Programmatic Environmental Impact Statement/ Overseas Environmental Impact Statement
for
Marine Seismic Research Funded by the National Science Foundation
or
Conducted by the U.S. Geological Survey

June 2011

Environmental Permitting

Every cruise funded by US agency requires an Environmental Assessment (EA) under the National Environmental Protection Act (NEPA)

Based on analysis of that EA, NOAA Fisheries Issues an Incidental Harassment Authorization (Marine Mammal Protection Act) and A Biological Opinion (Endangered Species Act)



Science Support Plan

R/V Marcus G. Langseth

ECS 2D Seismic Mission
2014
Cruise No. MGL14-XX
Deborah Hutchinson - USGS

Date:	February 4th, 2014
Compiled By:	Robert Steinhaus
	Jeff Rupert
	Robert Koprowski
	David Martinson

Distribution list:

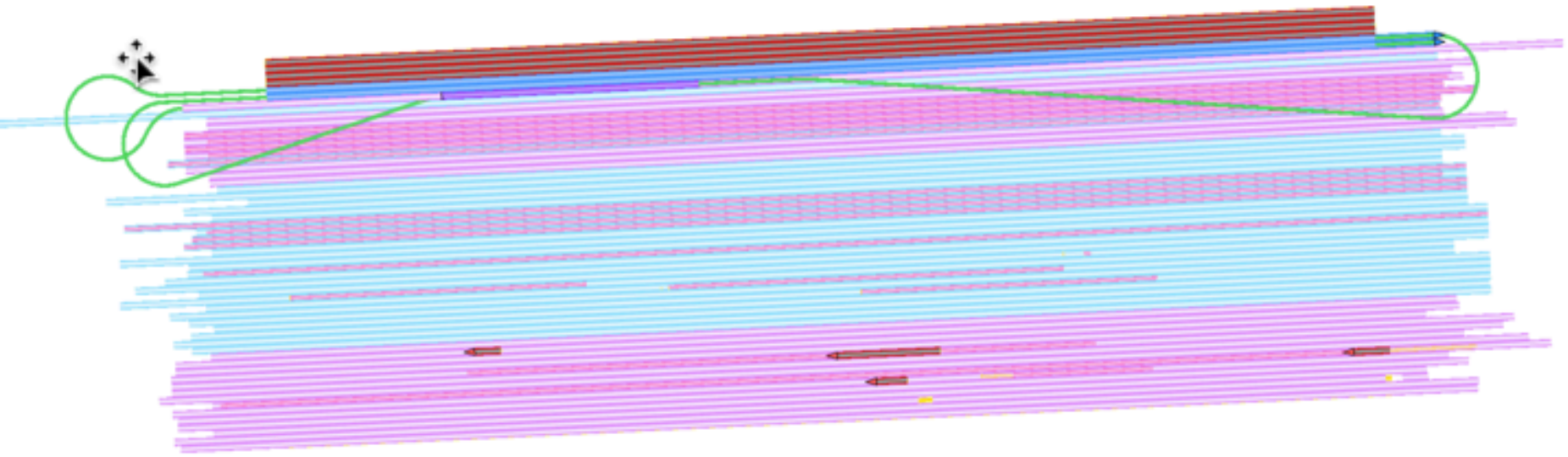
Copy:	Receiver:	Date
1	Chief Scientist	
2	NSF Ship Operations Program Manager	
3	NSF Technical Services Program Manager	
4	Vessel, Chief Science Officer	
5	Vessel, Captain/Chief Engineer	

CONTENTS

Transitioning of Long Core Facility

SurvOpt Software Output:

SurvOpt is an industry Survey Tracking/Planning Tool



Tracking 3D Survey Coverage

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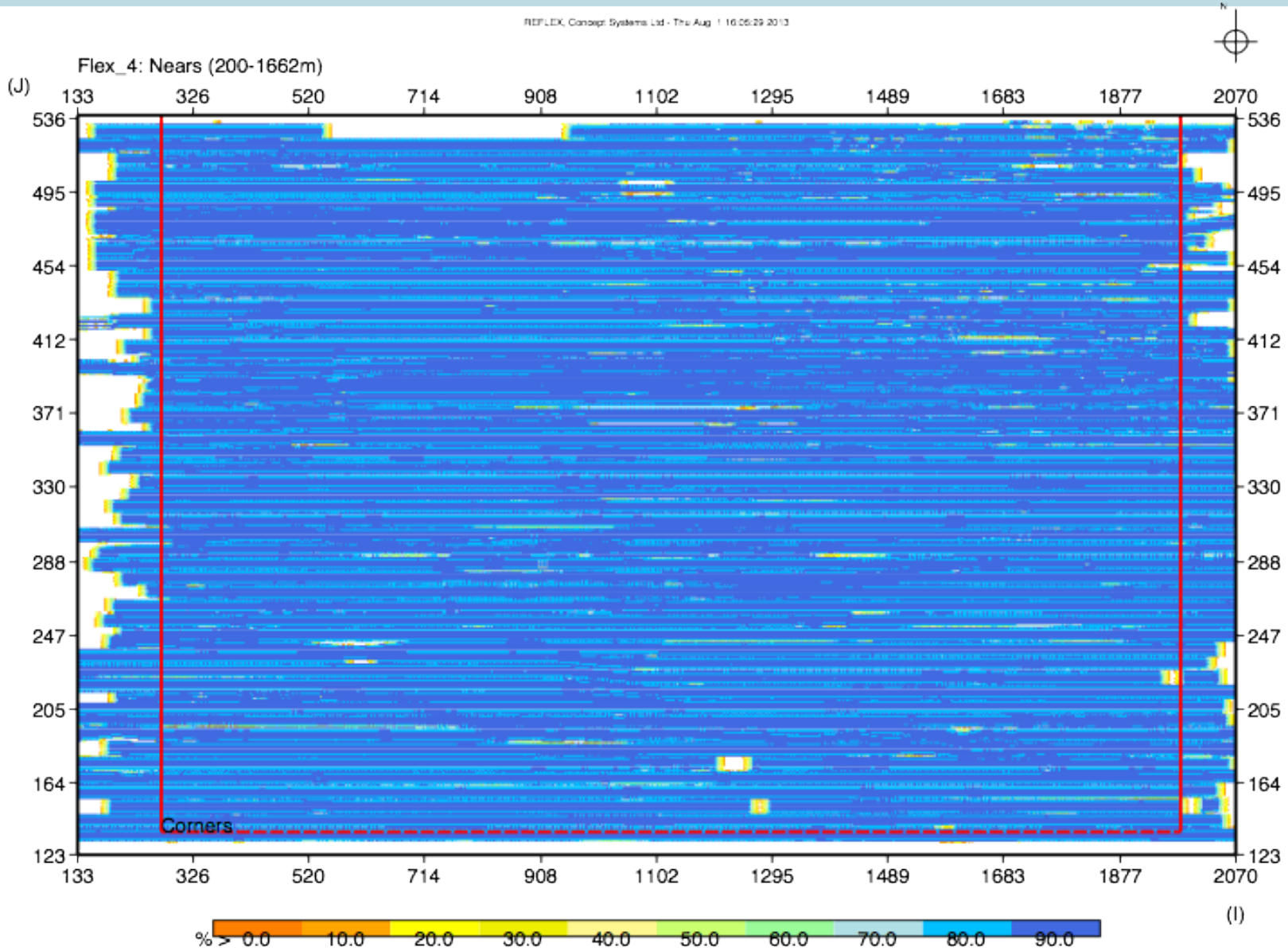
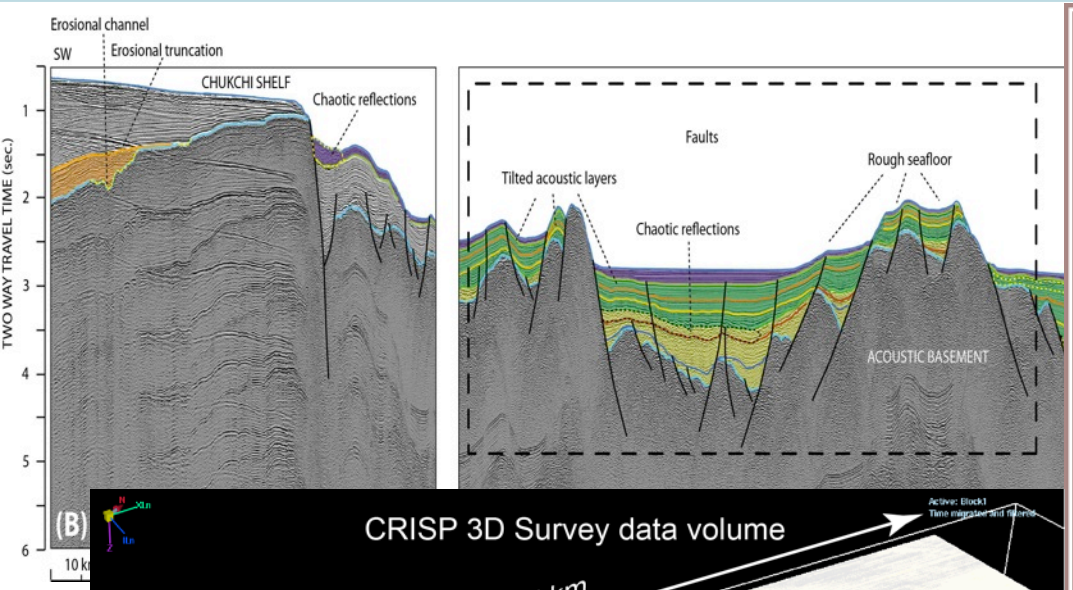
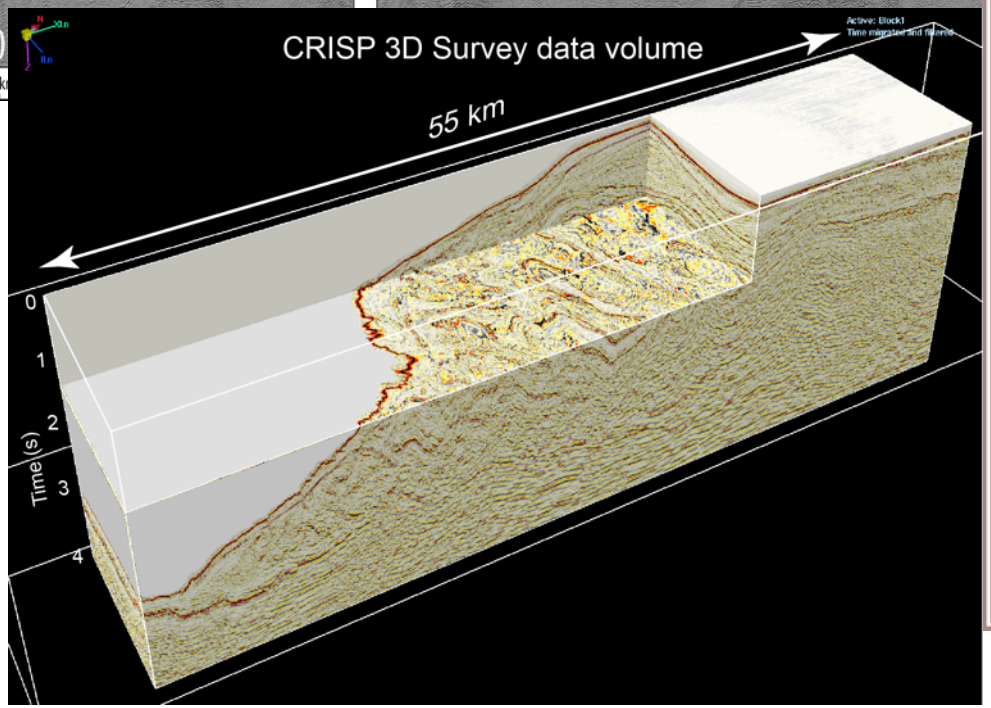
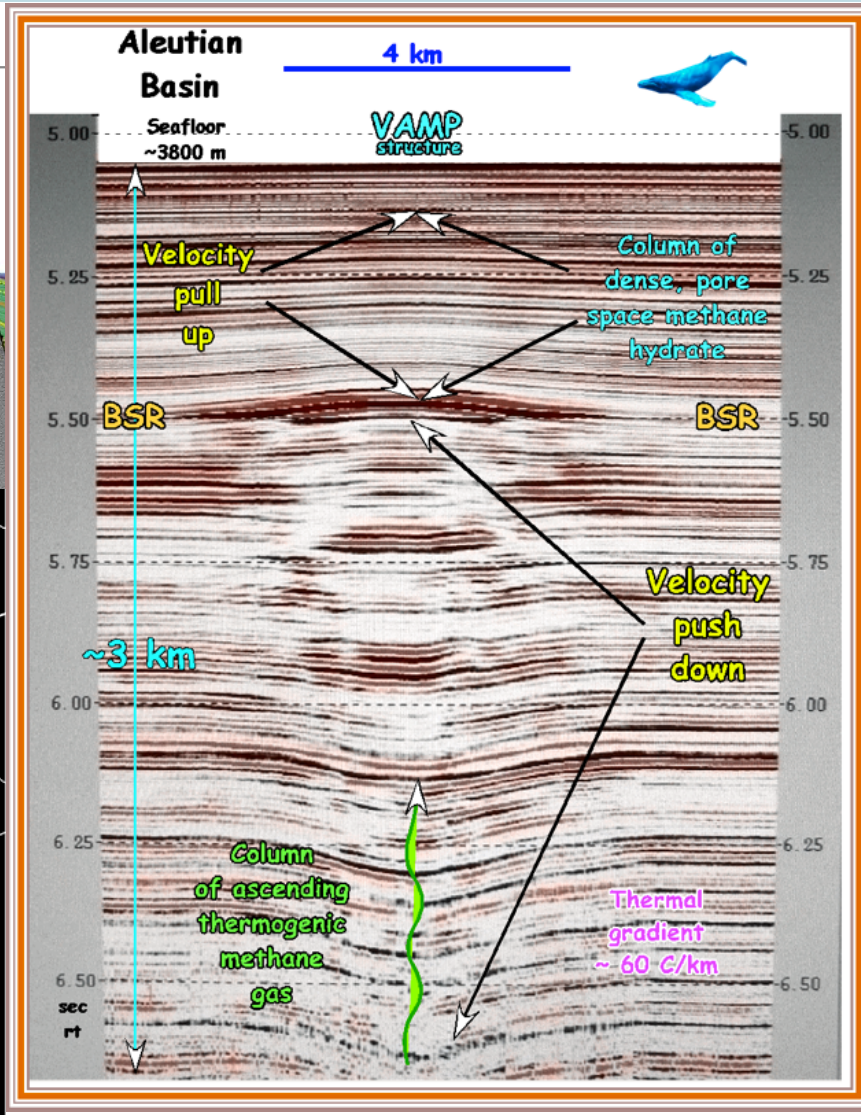


2D and 3D Products







Langseth: Performance Metrics

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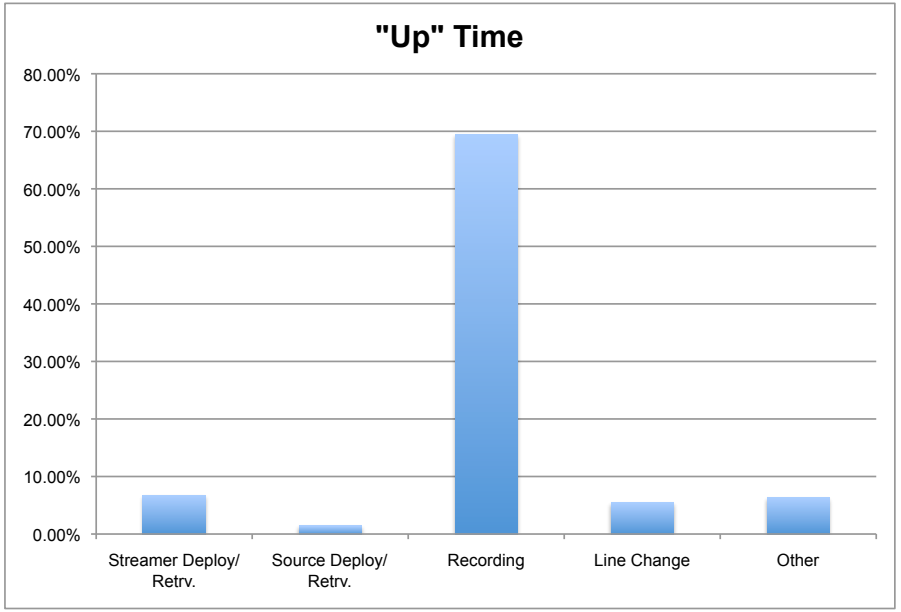
Summary Statistics:

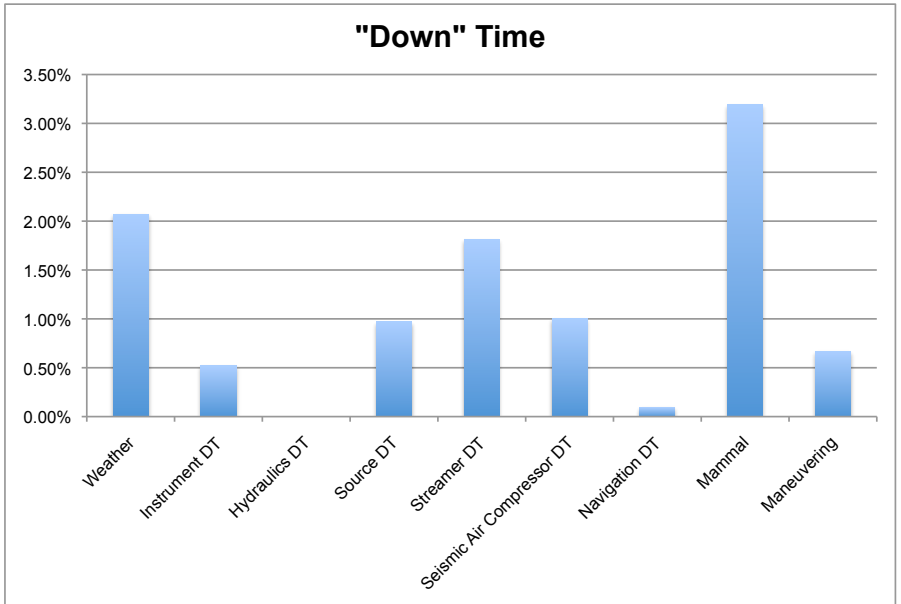
90% Overall "Uptime" for 2011

Operation	TOTALS(hrs)	PERCENTAGES
Streamer Deploy/Retrv.	194.05	6.76%
Source Deploy/Retrv.	42.02	1.46%
Recording	1997.15	69.53%
Line Change	158.55	5.52%
Other	183.82	6.40%
Weather	59.53	2.07%
Instrument DT	14.90	0.52%
Hydraulics DT	0.00	0.00%
Source DT	27.86	0.97%
Streamer DT	52.18	1.82%
Seismic Air Compressor DT	28.73	1.00%
Navigation DT	2.82	0.10%
Mammal	91.69	3.19%
Maneuvering	19.15	0.67%
	2872.46	100.00%

Note: Excludes Transit and Portcall

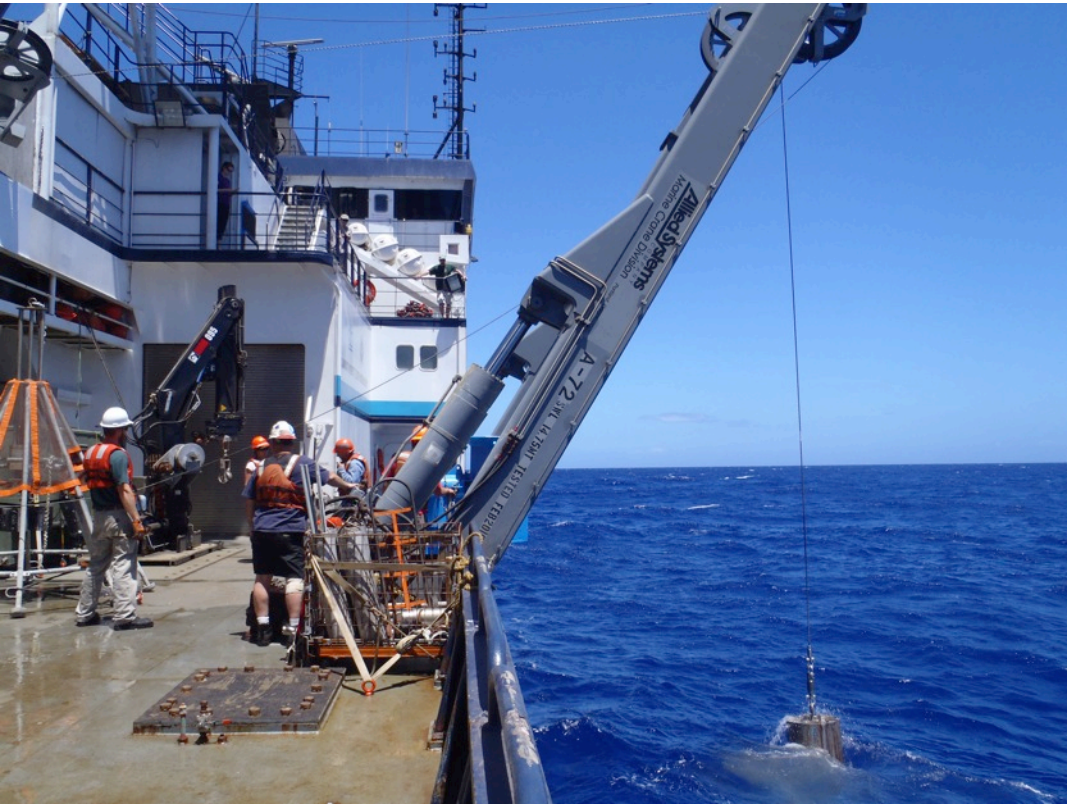
Operations Uptime in Red
Operations Downtime in Black

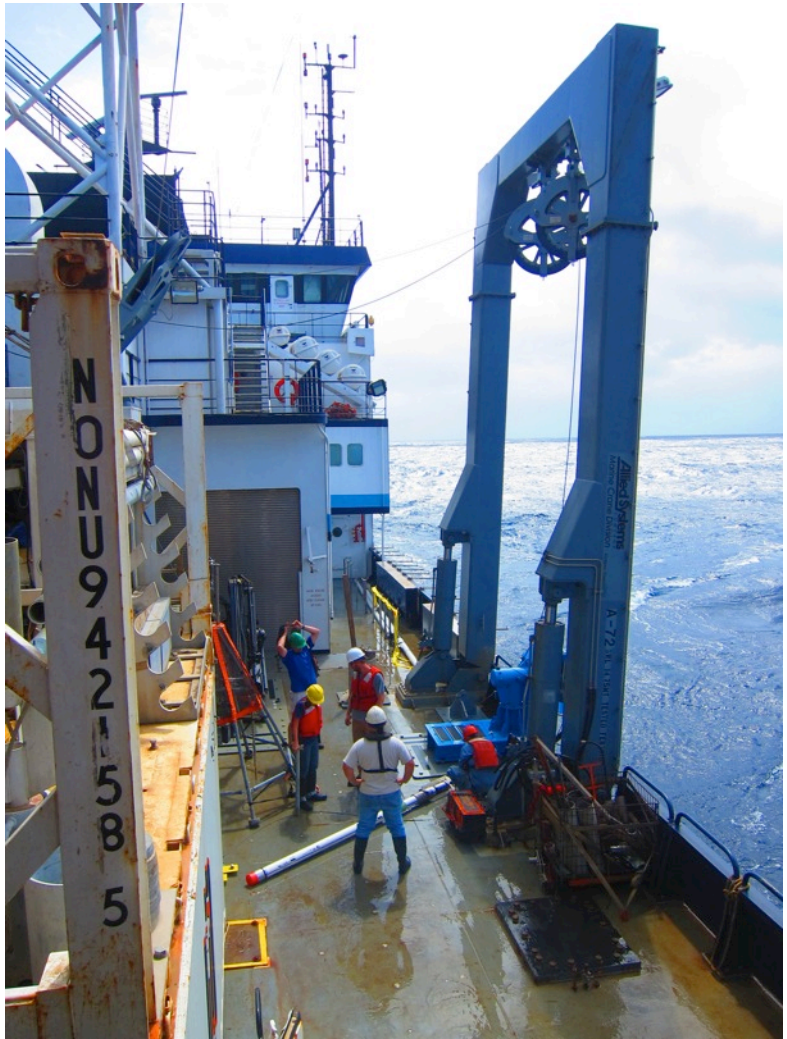




Deck Space for Line Islands Coring Cruise

The main deck space on Langseth was loaded with OSU coring equipment, MST van, Hiab Crane, multi-corer, CTD rosette, and core support equipment





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Starboard Side-Wet Lab Location

- Core cutting/splitting
- Multi-core extrusion
- POC and Uncontaminated SW sampling

Tivey/Butterfield - JASON ROV Cruise

On right, photo of Main deck layout of Medea/ winch, LARS crane, JASON and HPU, and support van.

Below, JASON on main deck..

Starboard Side Forward Dry Lab

Lab was outfitted with new tables, refrigerator, freezer, acid cabinet, and Millipore H2O system

Looking Forward