DESSC Early Career Scientists Workshop December 7, 2013

How to prepare for a cruise
How to play well with others
What to expect at sea
How to get the most out of your cruise
What to look out for

Human Occupied Vehicle - Alvin

South Pacific

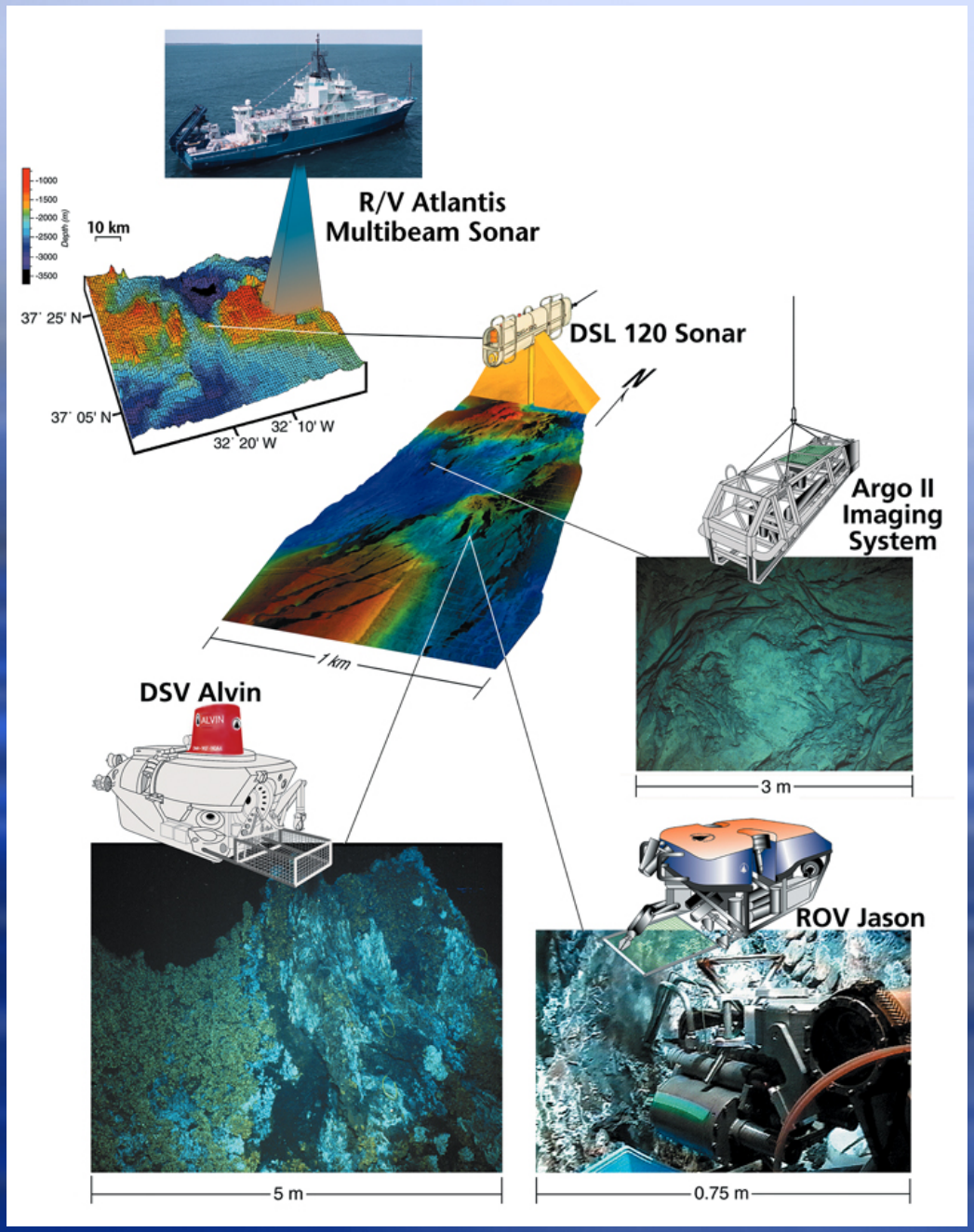
North Pacific

Life at Sea for The Investigators

Site Surveys

Know your area!

Get the most and best maps you can

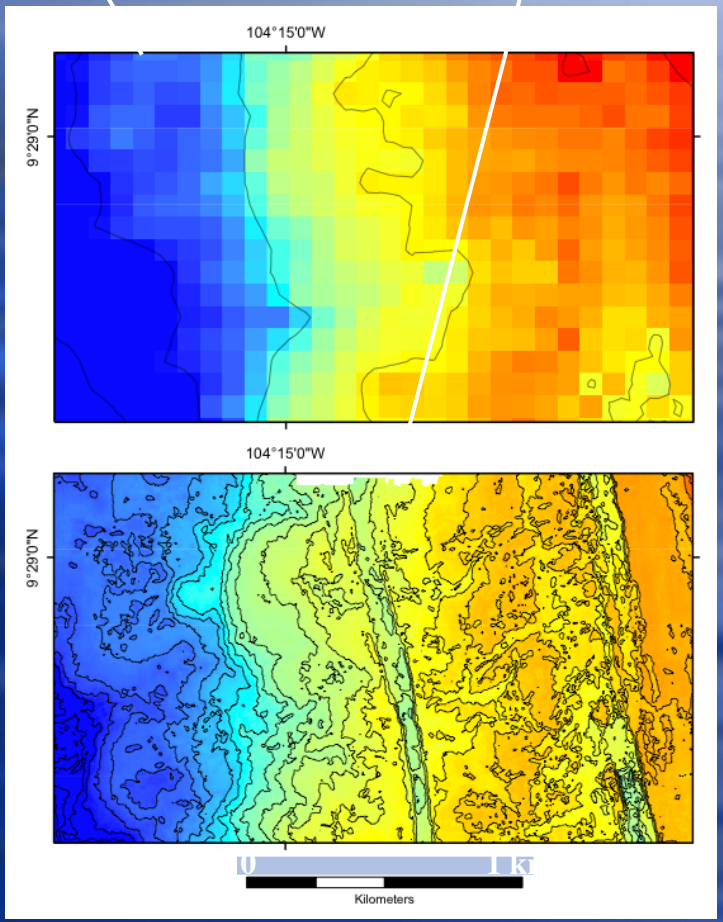


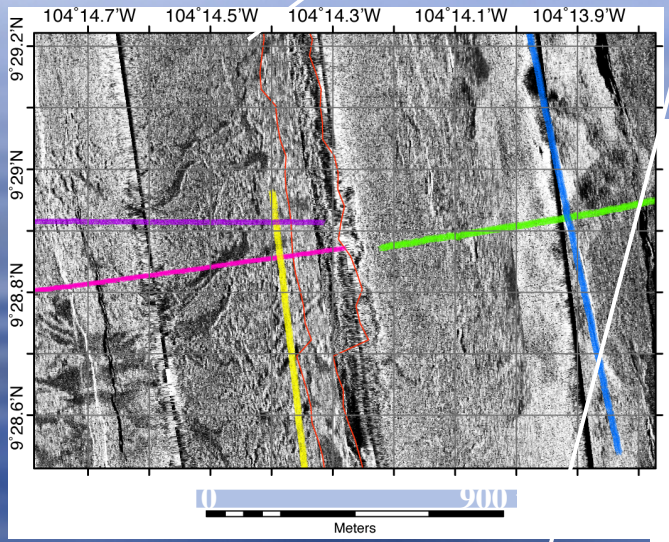
Find out all you can about your research area.

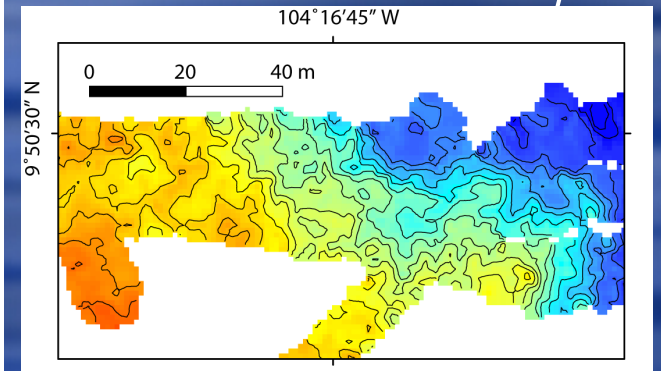
High Resolution Data Sets for the EPR ISS

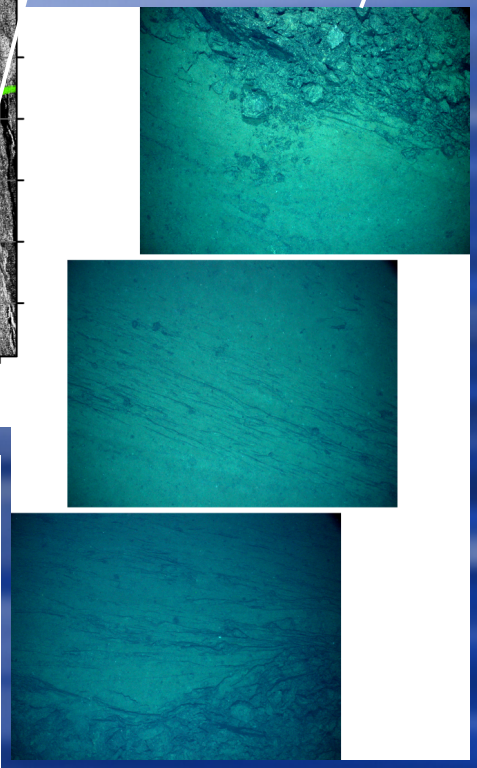
Multi-beam 12 kHz — **ABE Imagenex** 675 kHz, 40m alt — **DSL-120A** 120 kHz, 100 m alt — **Alvin Imagenex** 675 kHz, 5 m alt — **TowCam** 5 m alt

100 m / pixel — 5 m — 2 m — 50 cm — <1 cm









Cruise Planning Web Site

Oceanographic Institution

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SHIPS & TECHNOLOGY

- Ships
- Underwater Vehicles
- Ocean Observatories
- Instruments
- Cruise Planning
  - Ships
  - NDSF Vehicles
  - Other Vehicles
- National Deep Submergence Facility

Cruise Planning

SHARE THIS: TOOLS:

Preparing for a seagoing expedition involves many months (often years) of planning. There are many forms and documents to prepare; there are many criteria to be met and logistical issues to sort out; there are even issues of personal preparation. The most successful research cruises are typically the ones that are planned early, with an awareness of both the big picture and the fine details. To start, please indicate if you are using :

» Ships
» NDSF Vehicles
» Other Vehicles

And, review the following resources:

» Ship/ROV Schedules
» Agent Information
» Cruise Planning Questionnaire
» Cruise Synopsis
» WHOI Winch Pool
» Cruise Forms
» Ship & NDSF Contacts
» COI Small Boat Fleet
» Shared Equipment
» Vessel Chartering (pdf)
» Wood Packing Material -WPM Regulations

Cruise planning involves bringing together diverse people and equipment for a scientific cruise. Here the ROV JASON is being loaded aboard the Research Vessel Knorr (Tom Kleindinst - WHOI)

Successful Cruise Planning

- Gather a good group of scientists and students – need "worker bees"
- Pre-plan specific dives and objectives
- Make sure you have all the equipment and computers and ship them early
- Plan for sample prep and shipping
- Decide on night-time operations

Do your homework beforehand!

Know about vehicle capabilities

Woods Hole Oceanographic Institution

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SHIPS & TECHNOLOGY

- Ships
- **Underwater Vehicles**
  - NDSF Vehicles
  - HOV *DEEPSEA CHALLENGER*
  - HROV *Nereus*
  - AUVs
  - Towed Vehicles
- Ocean Observatories
- Instruments
- Cruise Planning
- National Deep Submergence Facility

National Deep Submergence Facility Vehicles

SHARE THIS: TOOLS:

The National Deep Submergence Facility builds and operates vehicles that take scientists or a "scientific presence" deep beneath the surface to observe, sample, and conduct experiments.

HOV *Alvin*

Alvin is a 3-person research submarine that takes scientists deep into the ocean. Since its launch in 1964, the *Alvin* has enabled more than 2,500 scientists, engineers, and observers to visit the floor of the deep sea.

ROV *Jason/Medea*;

Jason/Medea is a remotely operated vehicle (ROV) system designed and built by WHOI's Deep Submergence Laboratory. A 10-kilometer (6-mile) tether relays electrical power, control signals, data and live video imagery between a surface ship and the vehicle.

AUV *Sentry*

The autonomous underwater vehicle (AUV) *Sentry* is following in the wake of its predecessor, ABE, as a fully autonomous underwater vehicle capable of exploring the ocean down to 6,000 meters (19,685 feet) depth.

SHIPS & TECHNOLOGY

- Ships
- Underwater Vehicles
- Ocean Observatories
- Instruments
- Cruise Planning

National Deep Submergence Facility

- About NDSF
- HOV *Alvin*
  - *Alvin* Upgrade
  - Specifications
  - User Manual
  - Dive Log & Metadata
  - History of *Alvin*
  - Visual Tour
  - FAQs
  - Where is *Alvin* Now?
  - Schedule
- ROV *Jason/Medea*
- AUV *Sentry*

Human Occupied Vehicle *Alvin*

SHARE THIS: TOOLS:

WHOI operates the U.S. Navy-owned Deep Submergence Vehicle *Alvin* for the national oceanographic community. Built in 1964 as one of the world's first deep-ocean submersibles, *Alvin* has made more than 4,400 dives. It can reach nearly 63 percent of the global ocean floor.

The sub's most famous exploits include locating a lost hydrogen bomb in the Mediterranean Sea in 1966, exploring the first known hydrothermal vent sites in the 1970s, and surveying the wreck of RMS Titanic in 1986.

Alvin carries two scientists and a pilot as deep as 4,500 meters (about three miles) and each dive lasts six to ten hours. Using six reversible

Special Multimedia Feature

Alvin Interactive Guide

The deep diving submersible *Alvin* helped to turn a sunless, freezing marine world into a new frontier.

Alvin Around the World

Alvin Dive Sites (1988 to present)

See where *Alvin* has been and what it has found. (Requires Google Earth)

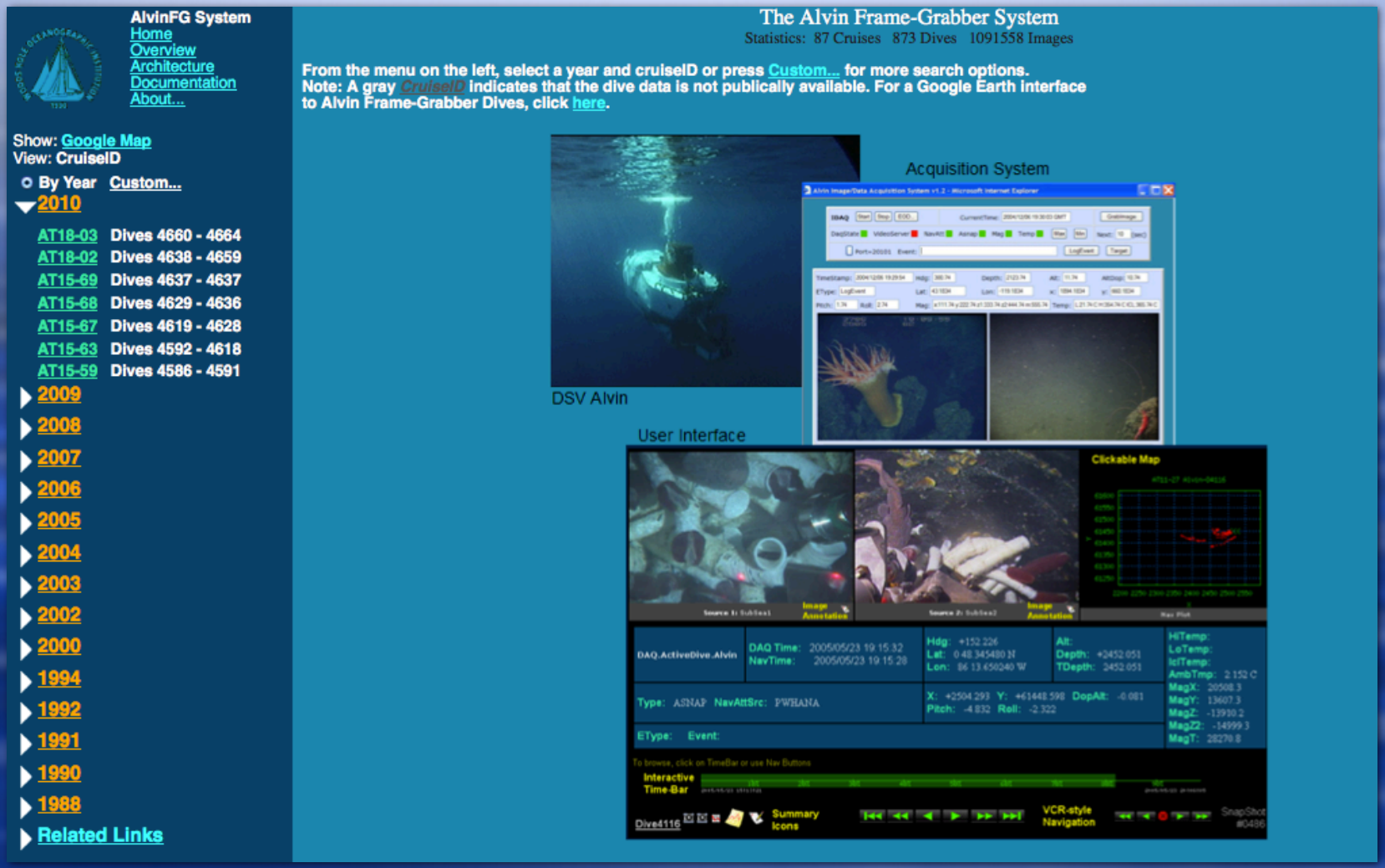
Multimedia

[ALL]

SLIDESHOW

Alvin in Photos

Practice a Dive with Virtual Alvin or Jason Virtual Control Van



Jason Virtual Control Van

Woods Hole Oceanographic Institution

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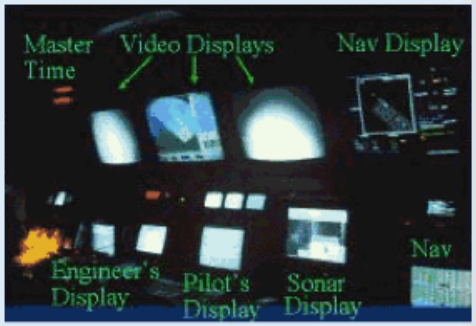
Jason Virtual Control Van

SHARE THIS: TOOLS:

Today's scientific underwater remotely operated vehicles (ROVs) generate a tremendous amount of data collected from a variety of sensors in real-time. Often integrated information such as multiple video streams, vehicle telemetry, and scientific data are only available to the users in the ROV control-van during real-time operations. Although all the data is logged, it is extrememly difficult for scientists to re-create this integrated information and have the ability to view and access an entire cruise data set in an integrated fashion.

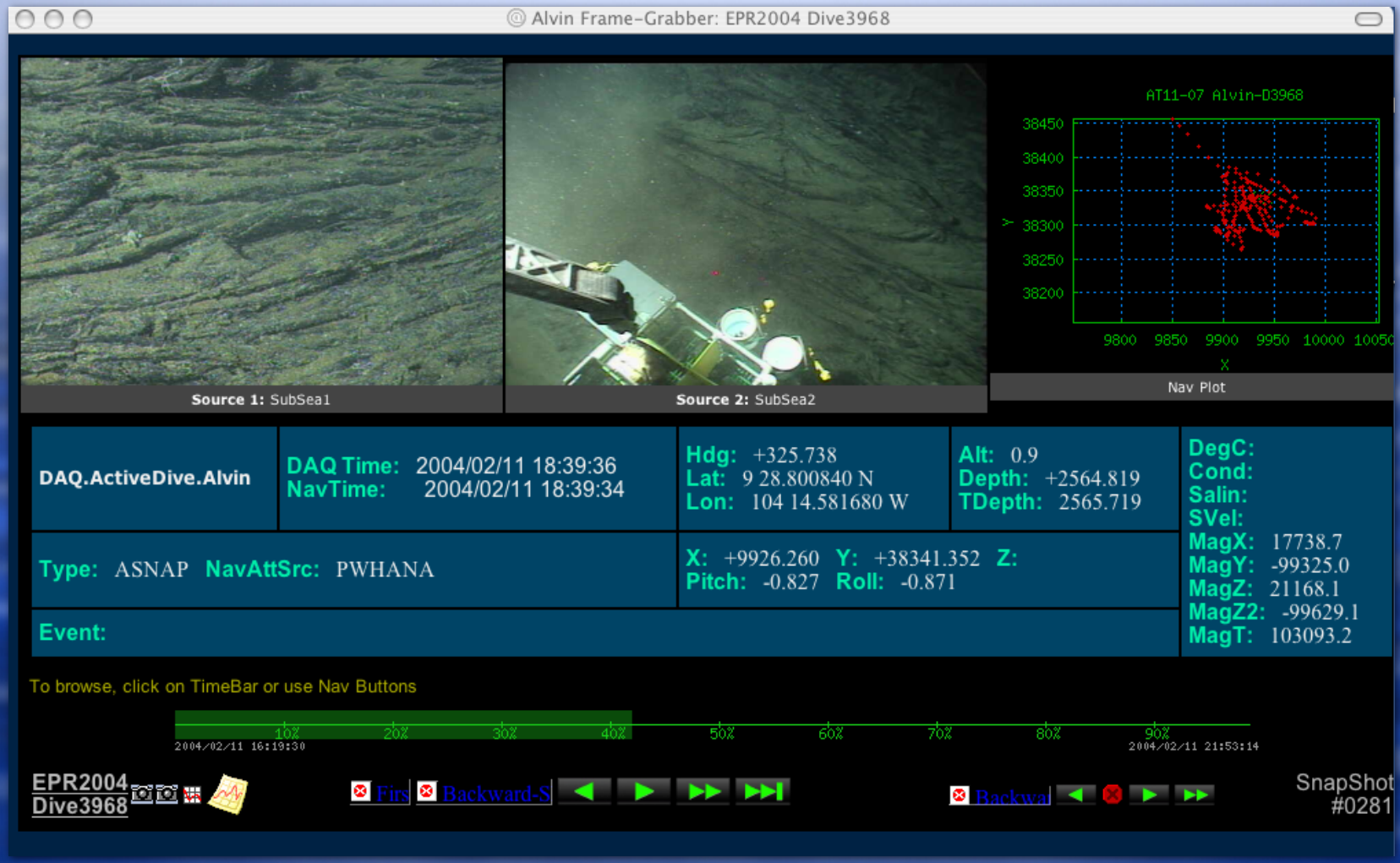
We introduce a methodology of taking real-time information snapshopts during events that occur within the ROV control-van. We snapshot "interesting" events as defined whenever a scientists enters an event via a computer, and we also take snapshots at regular time intervals such as once a minute to ensure complete data coverage. As part of the *Jason* ROV upgrade, we have developed the Virtual Van data acquisition system that automatically captures the information in the control-van during ROV operations including up to four simultaneous video sources, vehicle data, scientific instrument data, and event data. These control-van snapshots are automatically cataloged and immediately accessible and search able via a web-browser. The system is designed for both scientific and public outreach needs and has been integrated with the SeaNet system to provide remote on-shore access for scientific collaboration and public outreach. This technology of real-time image and data snapshots along with integrated web-based access has been extremely successful and has been



A view inside the Contol Van.

Shown above is a diagram of the layout and information available in the *Jason* Virtual Control Van. Features of the Virtual Control Van include: Monitoring real-time

Alvin Dive Replay



Marine Geoscience Data System – the place to find data

MGDS
MARINE GEOSCIENCE DATA SYSTEM

IEDA

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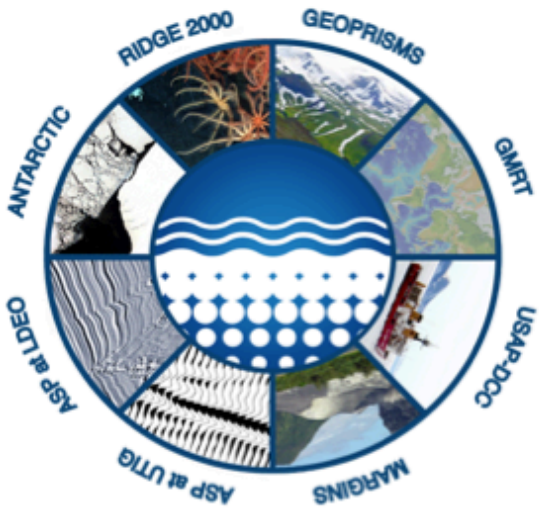
Data Portals



Our Data Portals provide custom access to data and metadata cataloged within the integrated Marine Geoscience Data System. Each Data Portal provides custom search options as well as an interactive map to facilitate data discovery.

Each Data Portal also provides news, references, cruise information, the names of contributing scientists, and other program-specific information. Select a Data Portal from the image or by using the Data Portals pulldown menu.

Our Integrated Search Interface can be used to discover data cataloged in our integrated system including all of our Data Portals. By contrast, Custom Search Interfaces (e.g. MARGINS, GeoPRISMS, Ridge 2000) limit results to data within a specific Data Portal.

MGDS
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Discover, explore, and visualize data using our suite of visualization tools & services. Learn more >

GMRT MapTool

Create your own custom maps & grids! GMRT MapTool provides instant access to our GMRT Synthesis, a global multi-resolutional data set which includes seafloor bathymetry data to 100-m resolution where data are available.

Hosted by Marine Geoscience Data System at Lamont-Doherty Earth Observatory of Columbia University

GeoMapApp©

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Download Links

New! August 1, 2013: *GeoMapApp version 3.3.8*

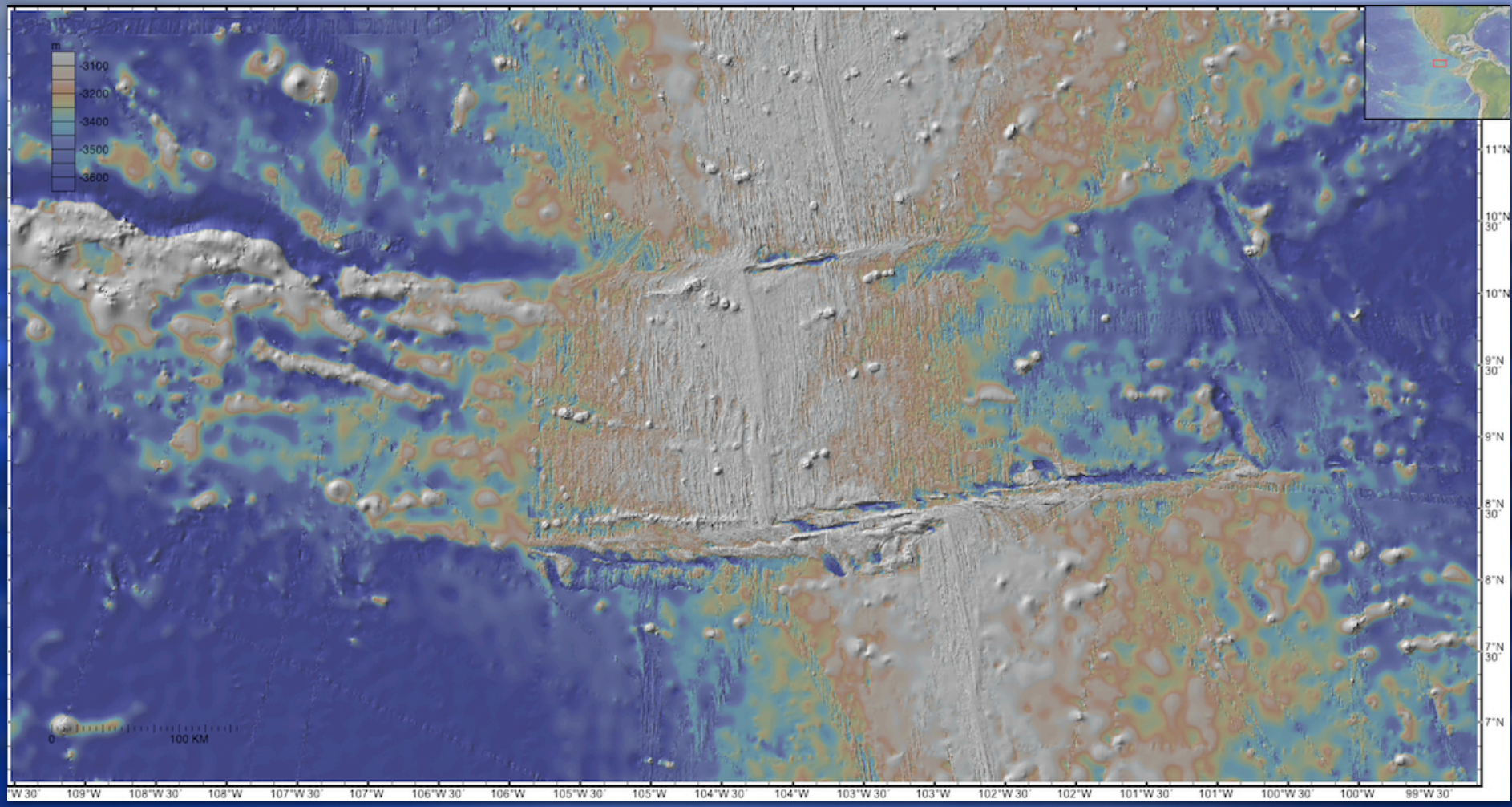
GeoMapApp is an earth science exploration and visualization application that is continually being expanded as part of the Marine Geoscience Data System (MGDS) at the Lamont-Doherty Earth Observatory of **Columbia University**. The application provides direct access to the Global Multi-Resolution Topography (GMRT) compilation that hosts high resolution (~100 m node spacing) bathymetry from multibeam data for ocean areas and ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) and NED (National Elevation Dataset) topography datasets for the global land masses.

Requirements

The application runs in the Windows XP, Windows Vista, Windows 7, Windows 8, Mac OS X (10.4, 10.5, 10.6, 10.7, 10.8), Linux and Solaris operating systems using the Java Runtime Environment (requires version 1.5.0_08 or more recent).

Use the **Download Links** on the left to install the application.

GeoMapapp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-3500
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100 KM
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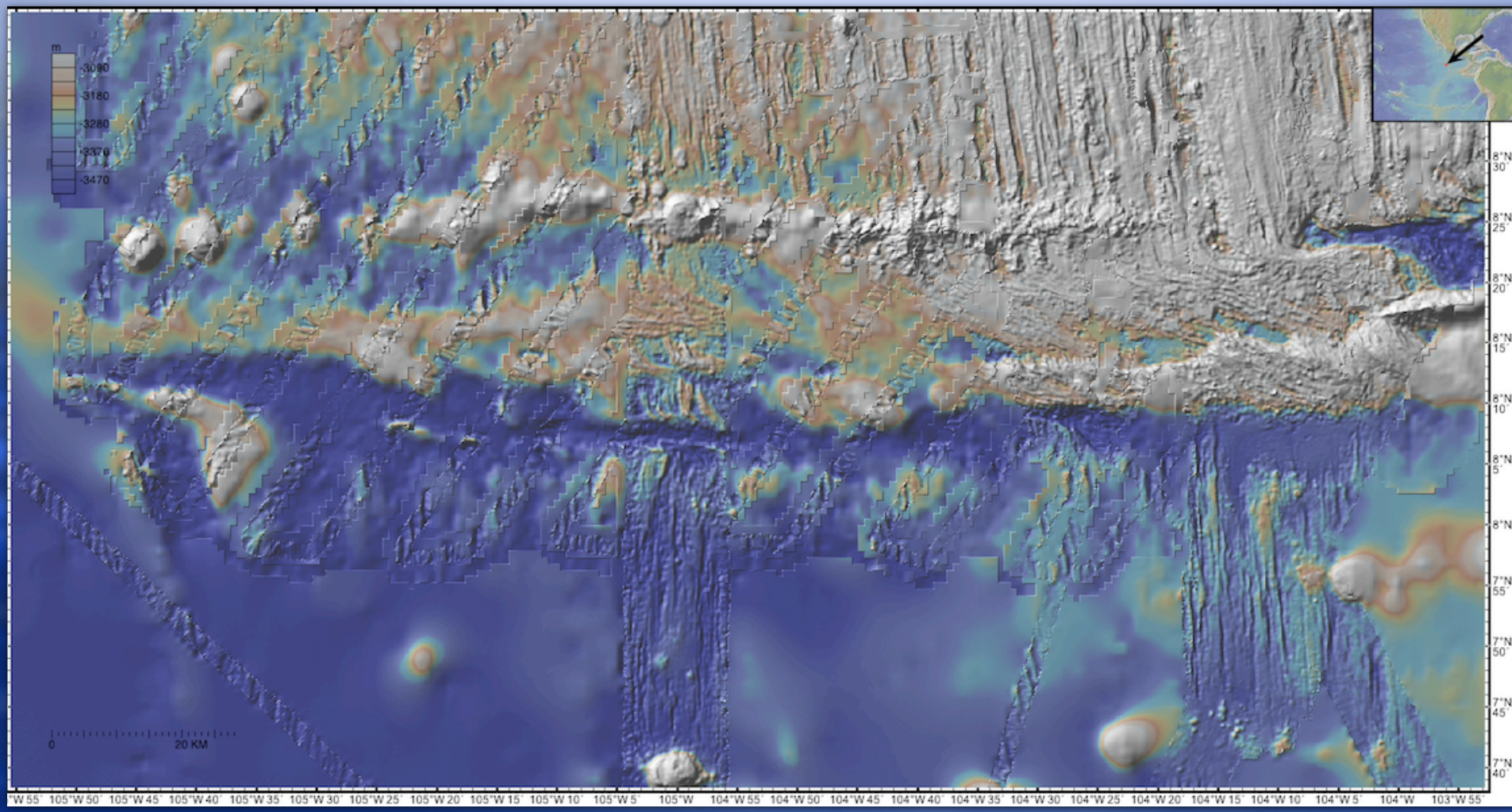
m
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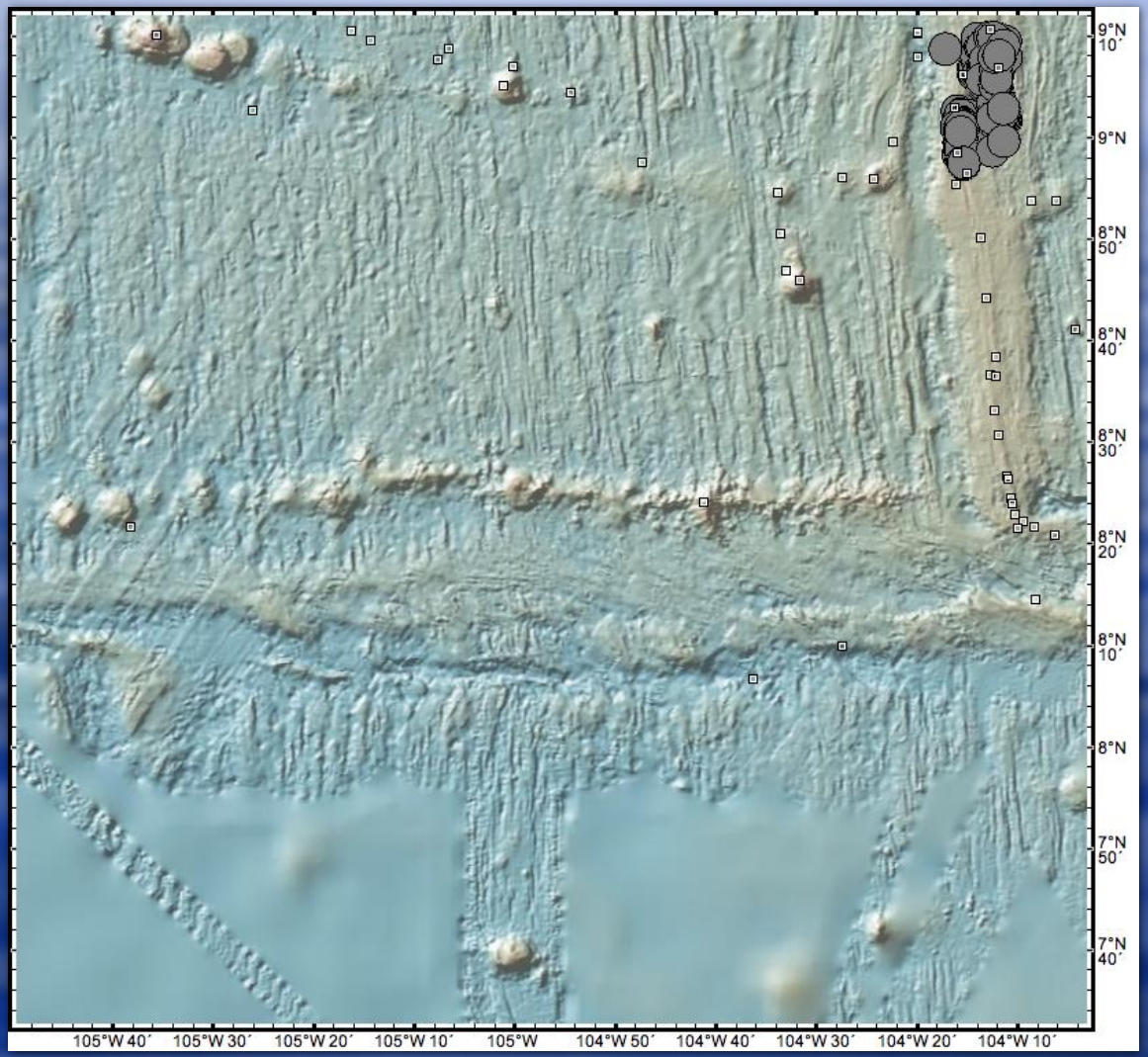
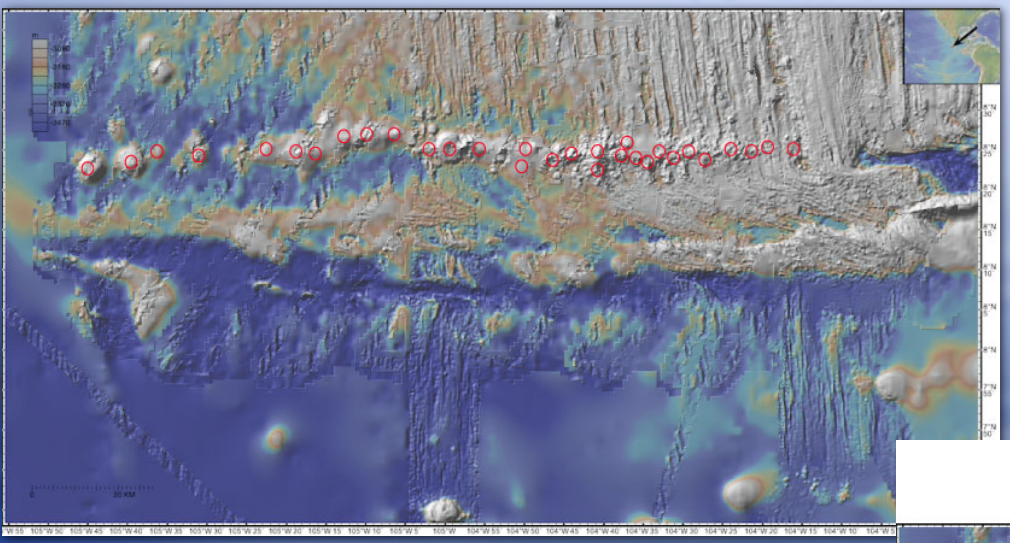
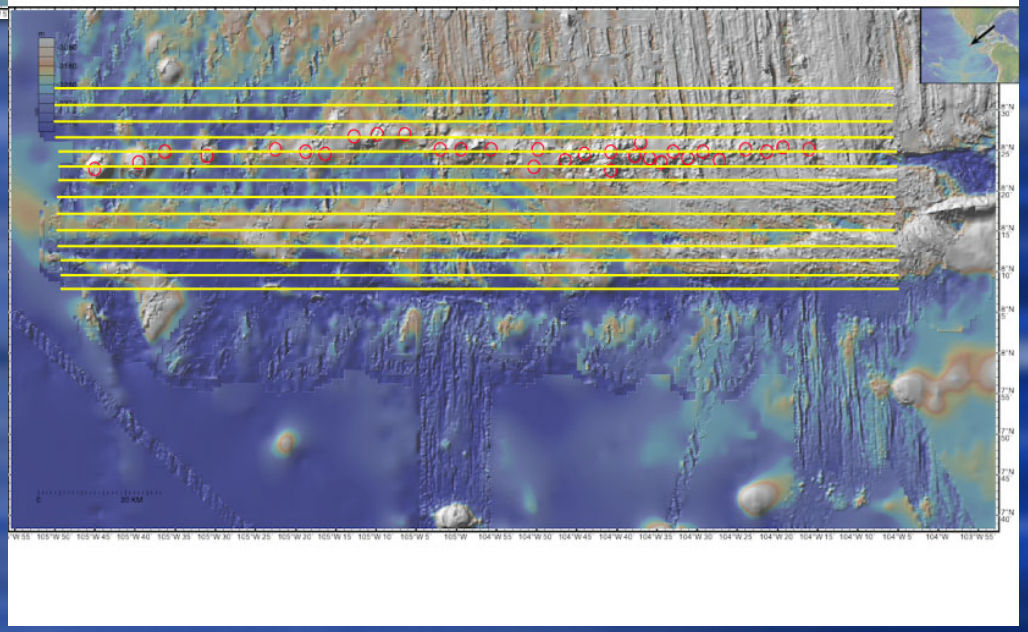
Sample Locations PetDB



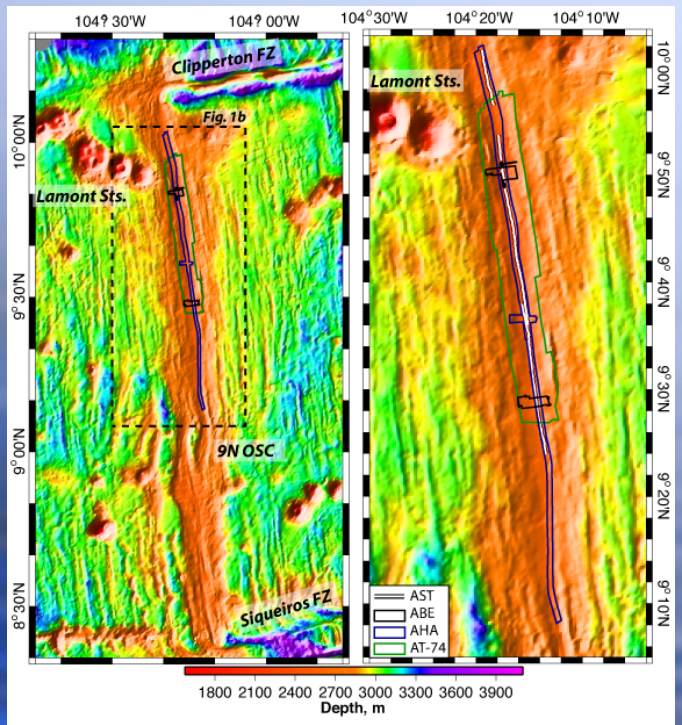
Plan where and what you want to do

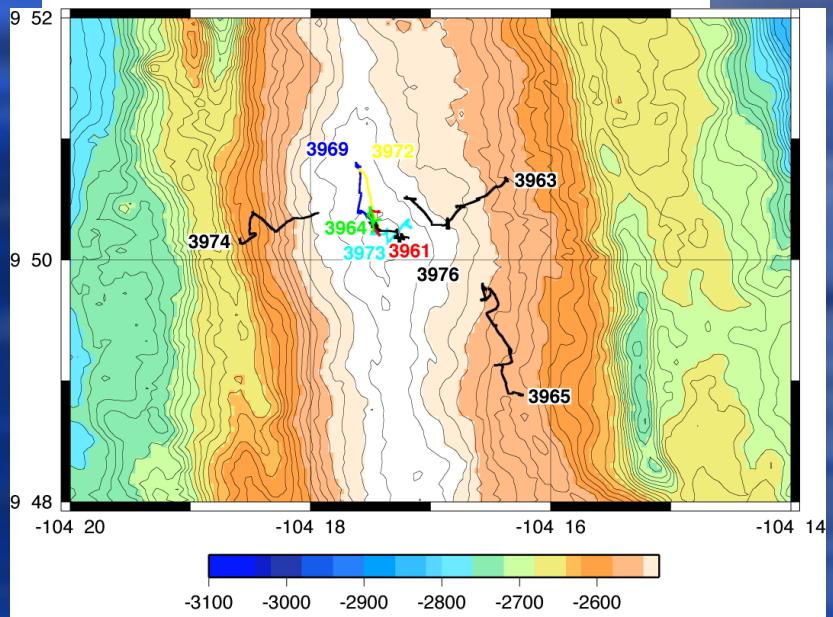


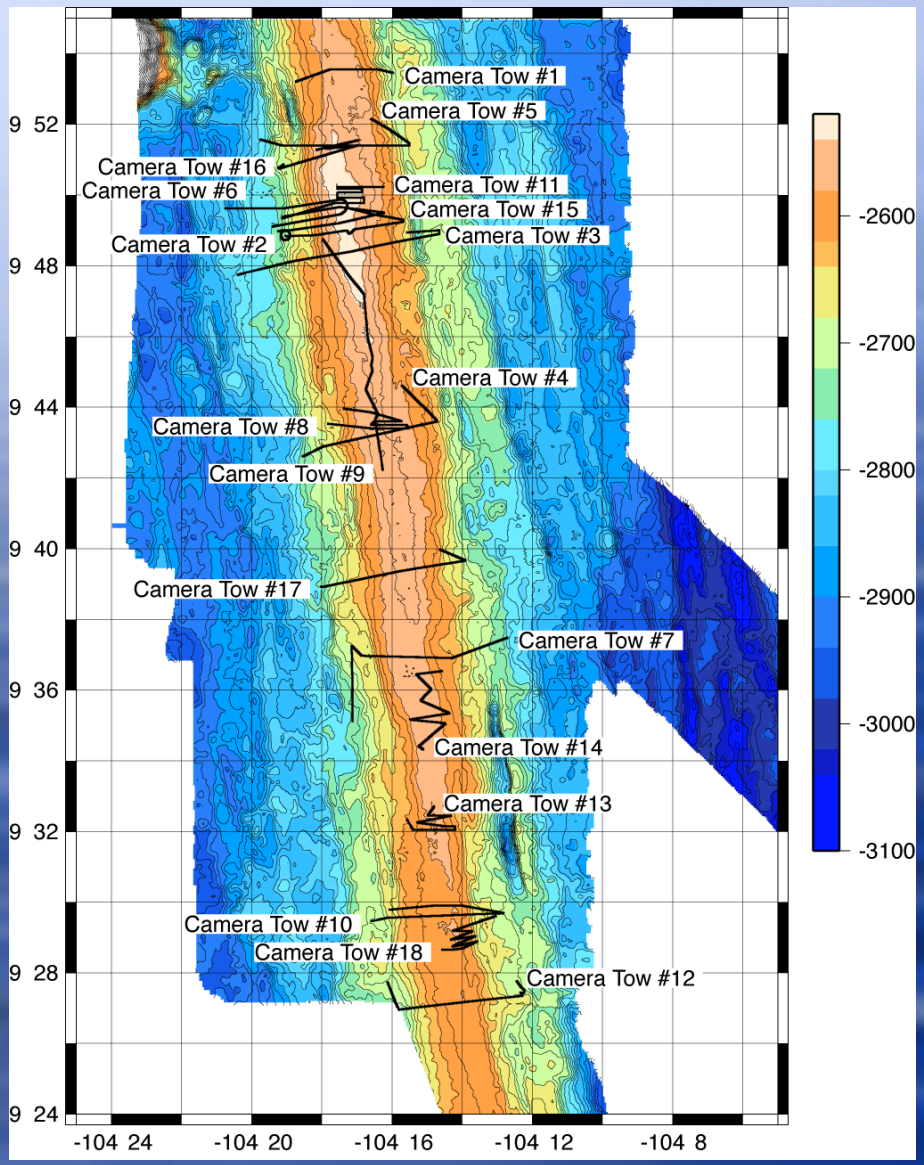
22 nm x 103 nm box
3000 m = 1.6 nm
14 lines x 12 hr/line = 7 days for multibeam and underway geophysics (mag/gravity)



EPR High-Resolution Bathymetric, Sidescan, and Magnetics Datasets - AT7-4 and AT11-7 cruises





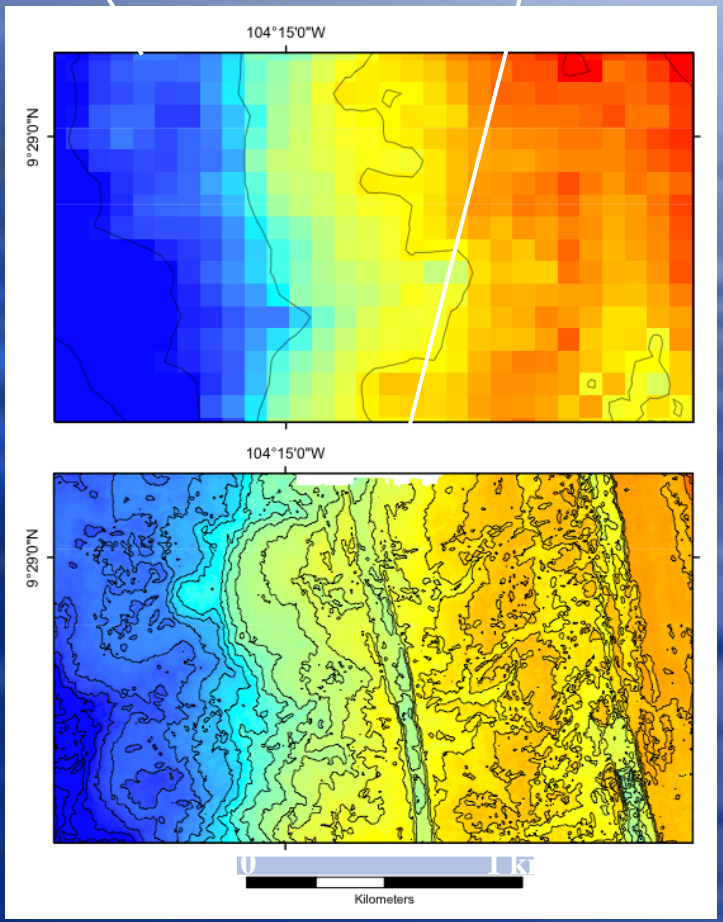


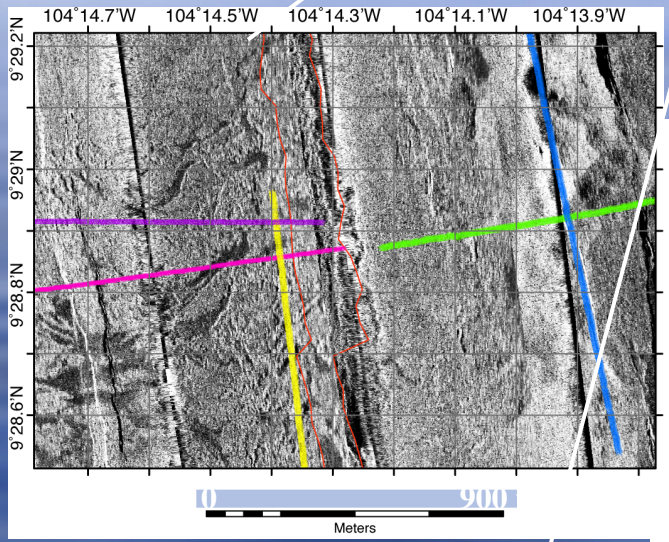
(Fornari, Soule, Perfit, Tivey, Schouten, Escartin, publications)

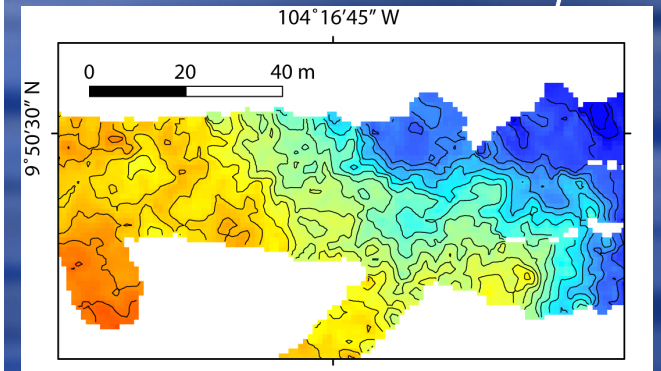
High Resolution Data Sets for the EPR ISS

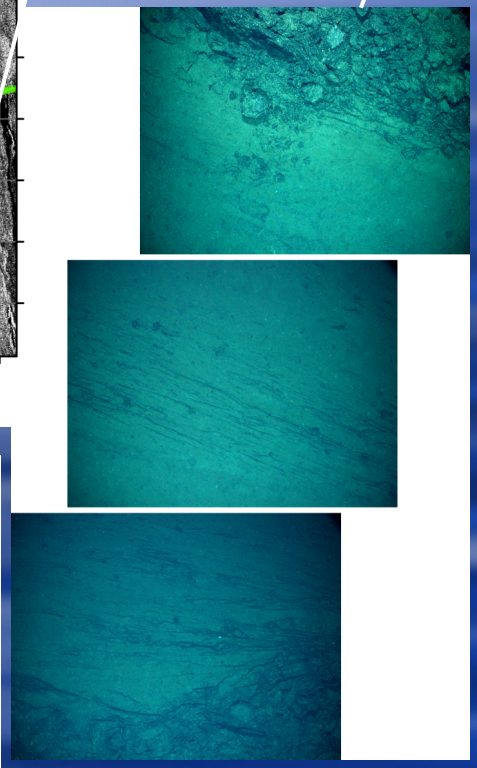
Multi-beam 12 kHz — **ABE Imagenex** 675 kHz, 40m alt — **DSL-120A** 120 kHz, 100 m alt — **Alvin Imagenex** 675 kHz, 5 m alt — **TowCam** 5 m alt

100 m / pixel — 5 m — 2 m — 50 cm — <1 cm

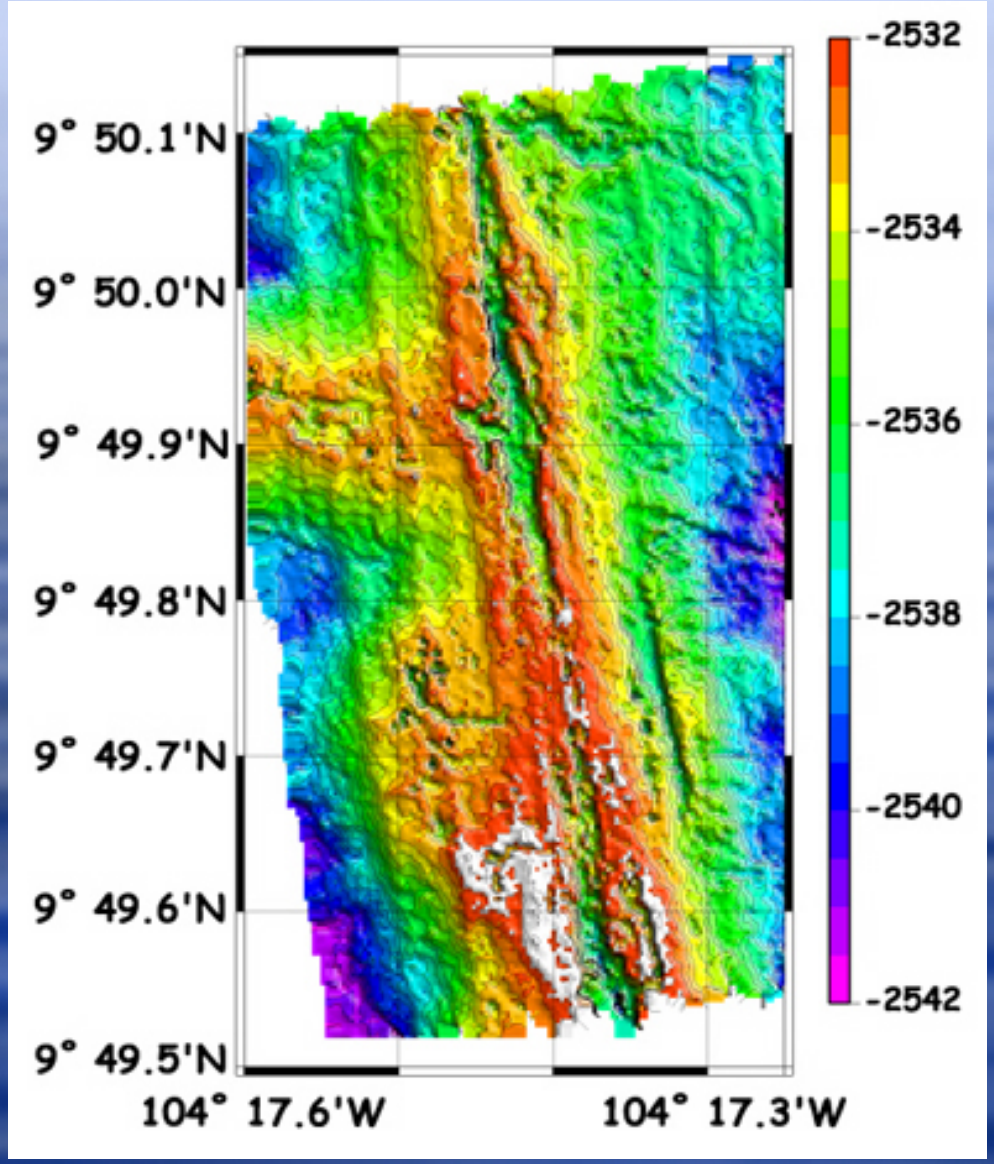




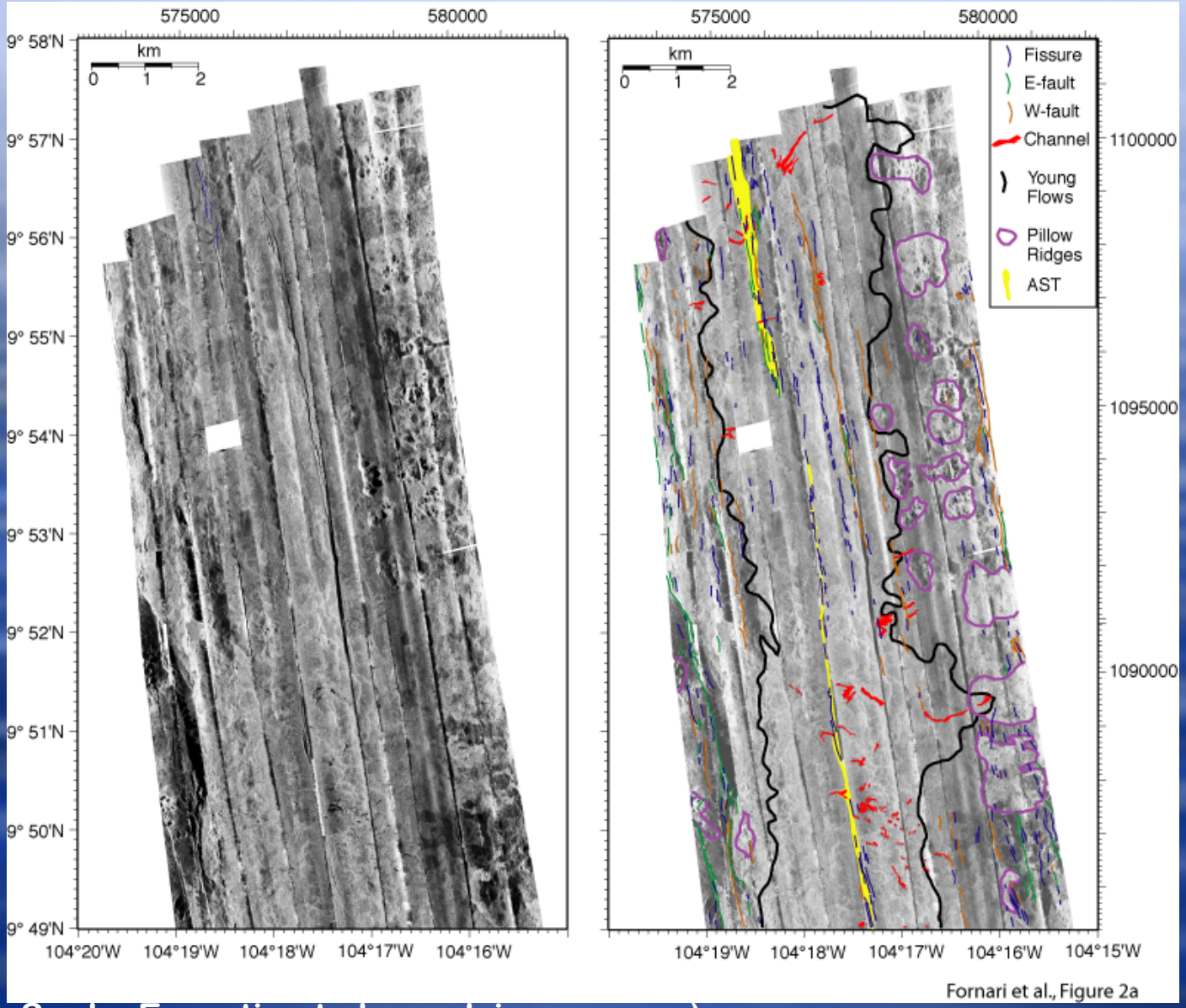




Microbathymetry - Axial Summit Collapse Trough

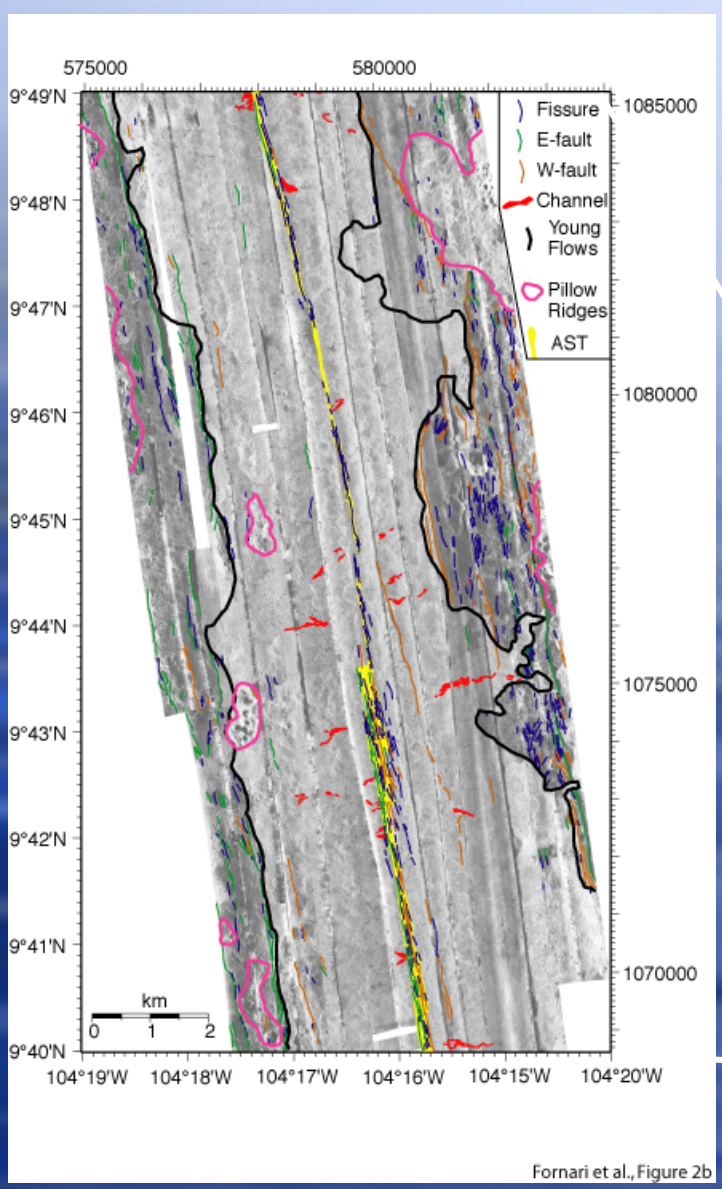


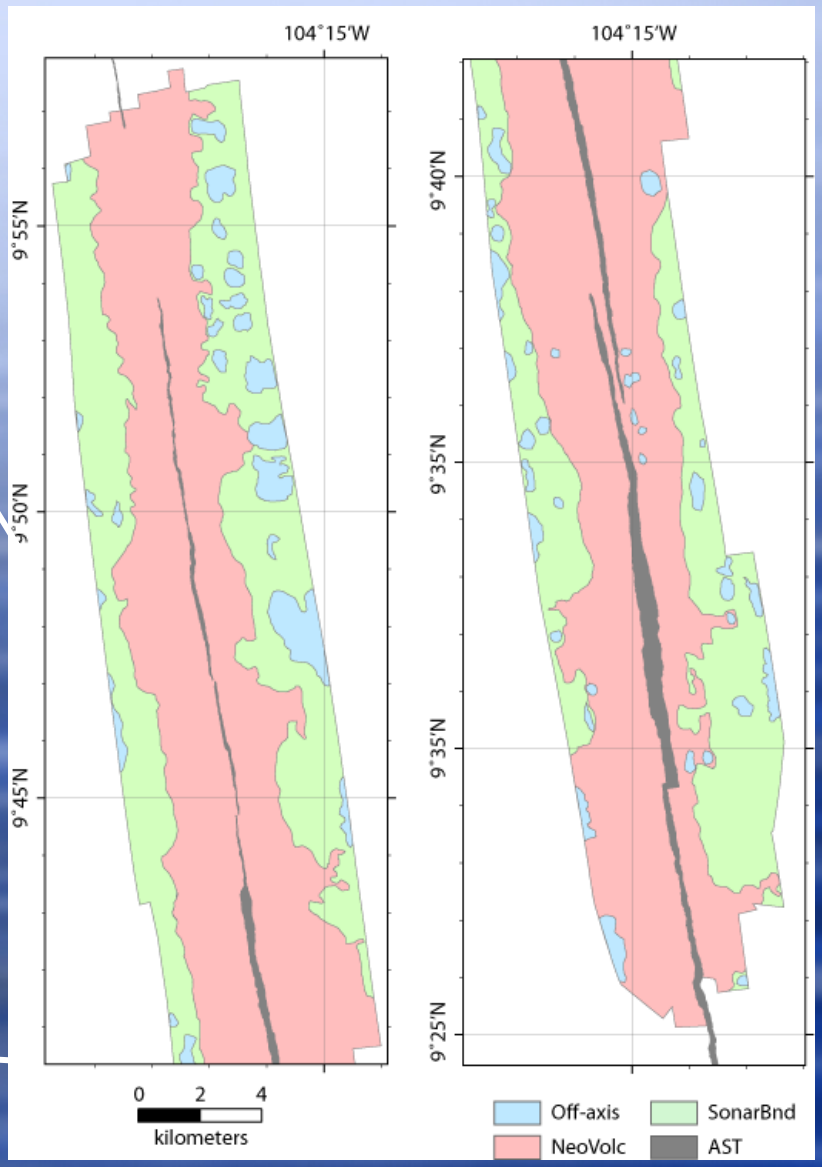
Volcanic and Tectonic Interpretation of DSL-120A Sidescan Data



(Fornari, Soule, Escartin et al., work in progress)

Producing a Geologic Map of the EPR Crest 9°-10°N





(Fornari, Soule, Escartin et al., work in progress)

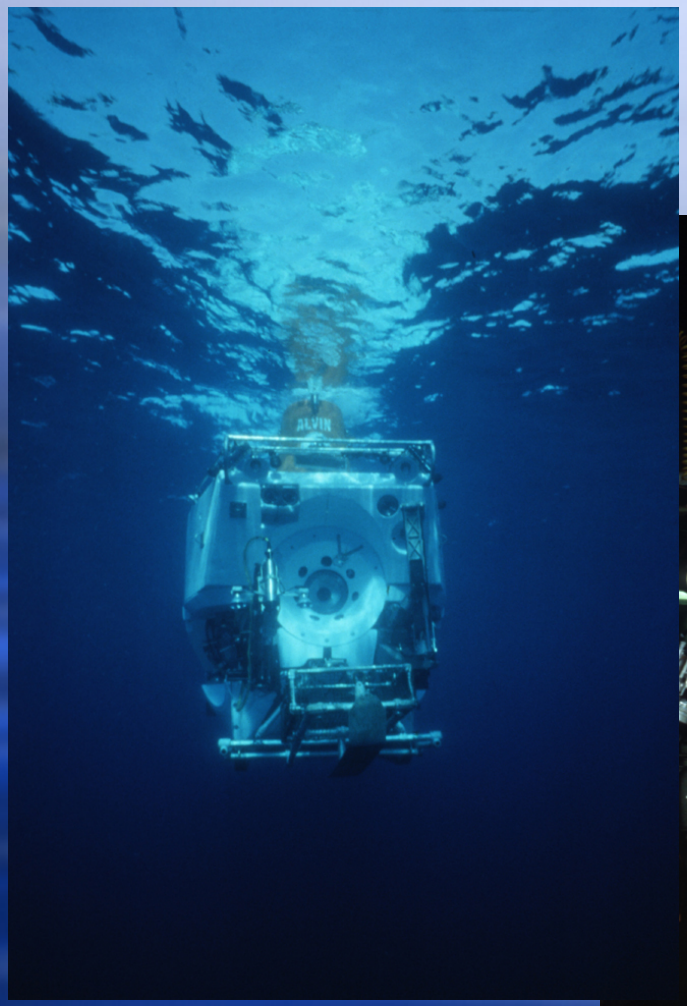
Pre-dive Preparation

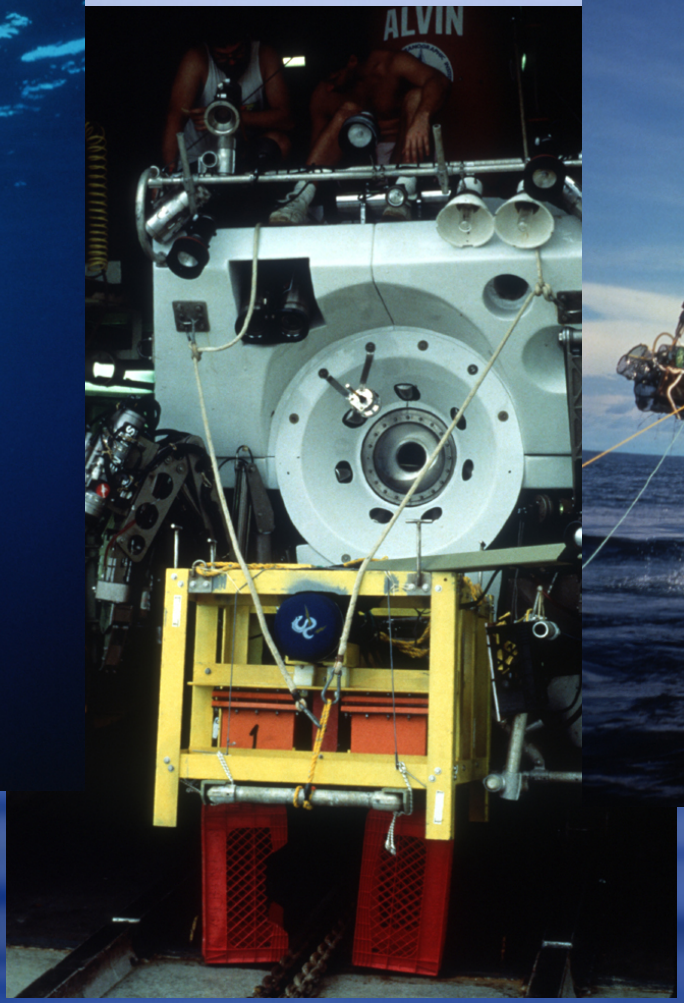
Make sure the Expedition Leader and Pilots are totally aware of dive objectives – have a plan

Basket + external equipment configured the night before dive.

Don't attend "mexican food night" pre-dive

DSRV Alvin - HOV

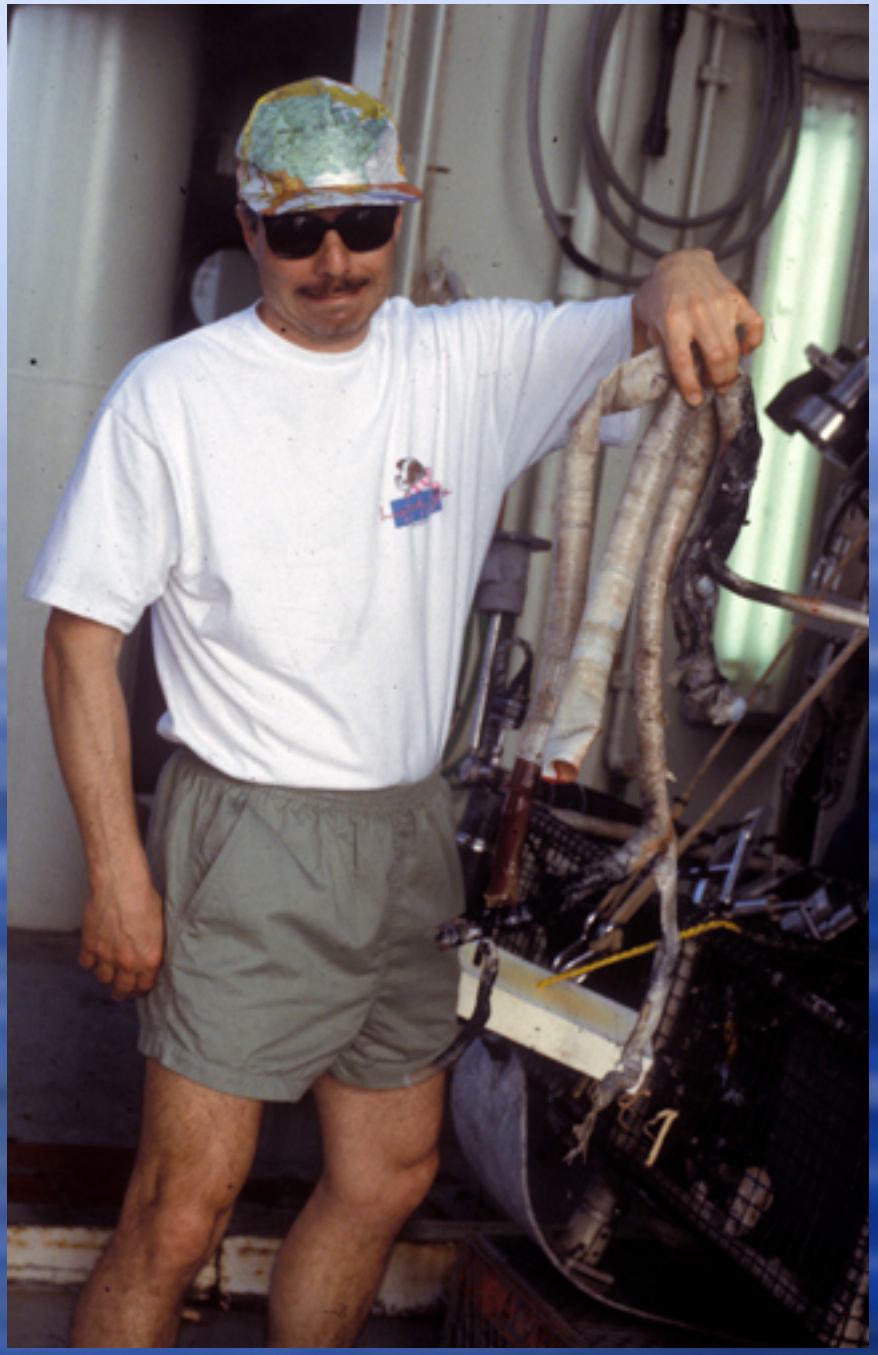




IN THE “BALL”

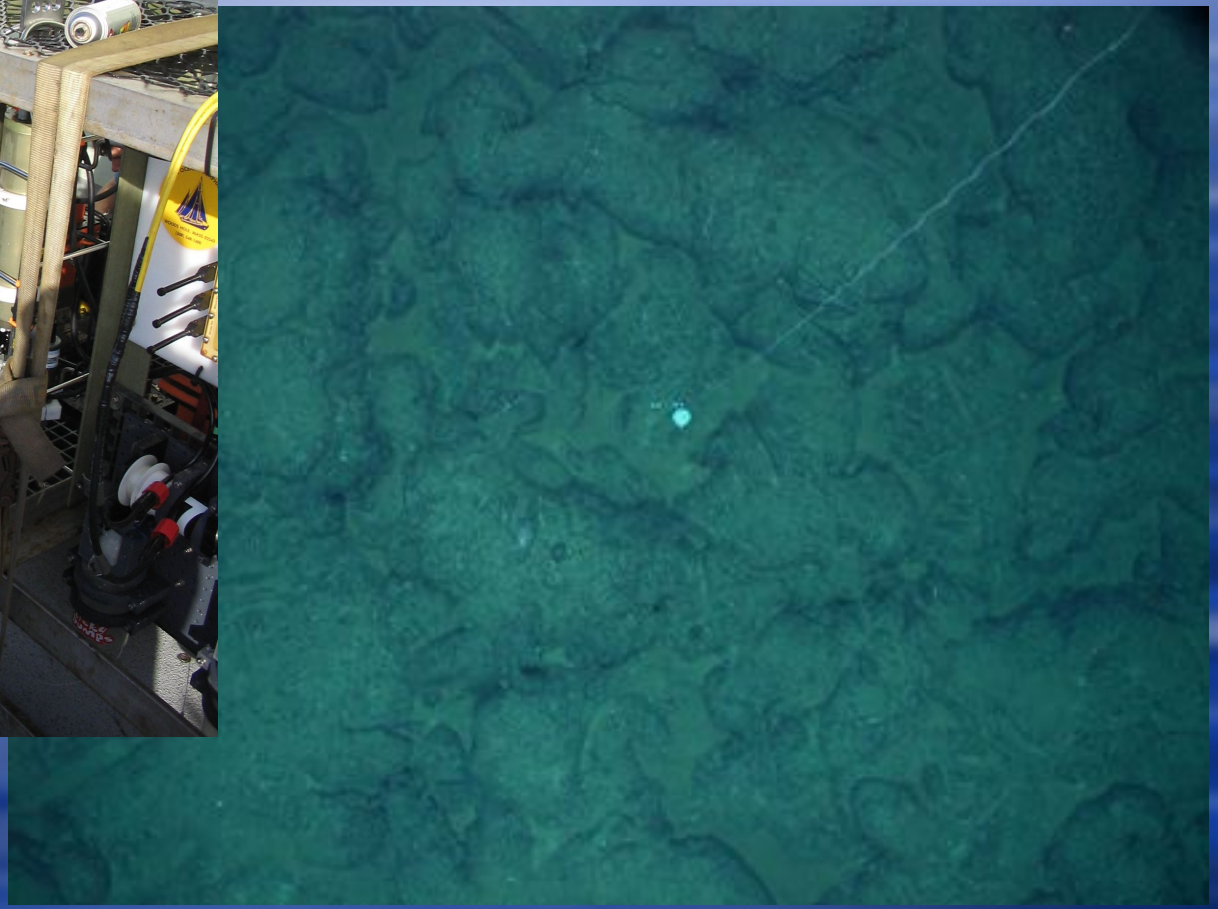
Unloading samples from Alvin after a dive on the EPR

Sample processing



Other Operations
Generally at Night

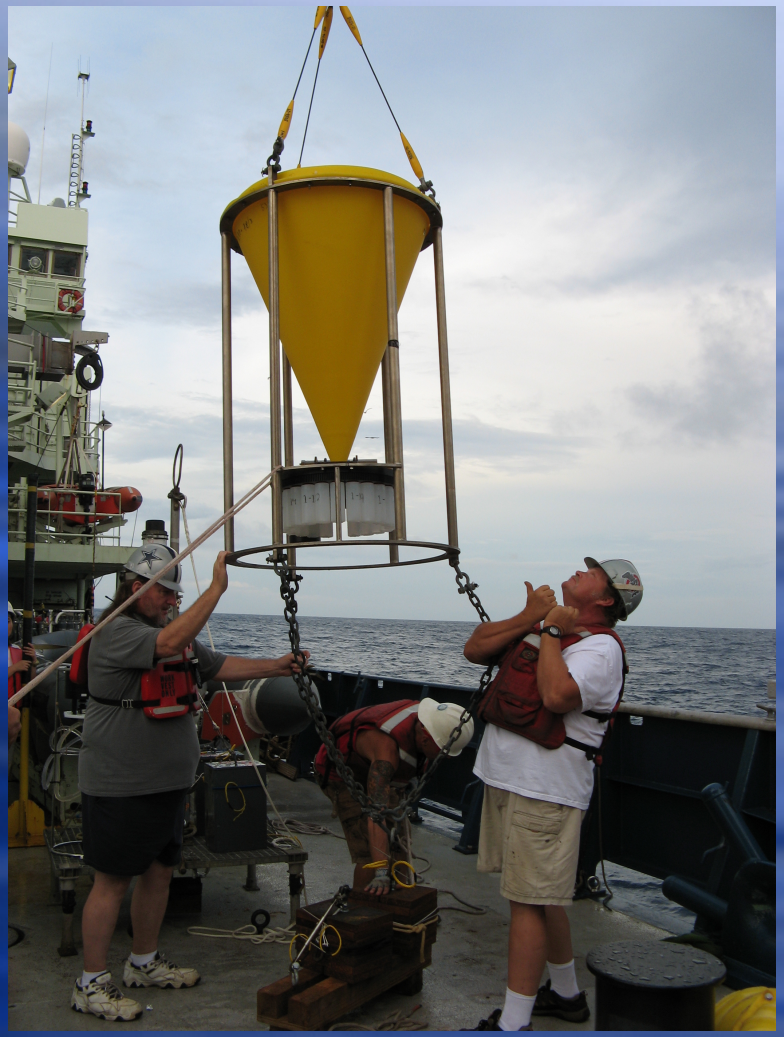
Towcam and wax-ball sampler

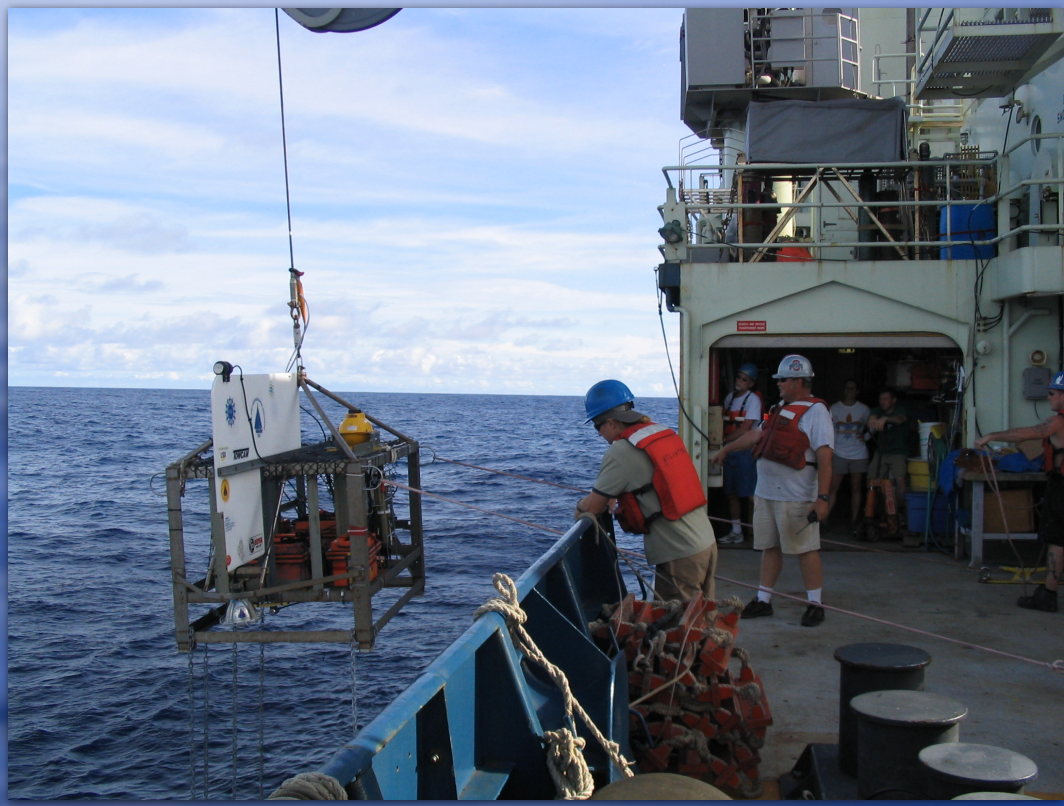


Dredging

Dredging Technique

Deploying Equipment





Students analyzing hydrothermal fluids from smokers on the East Pacific Rise

Tica Site - EPR - 2004