International & Deep-Submergence Cruise Planning

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International Cruise Planning

•Apply for foreign clearance >7 mo in advance. Often you can work through Ship Scheduler/Clearance Officer

•Country specific requirements at:
http://www.state.gov/e/oes/ocns/opa/rvc/country/index.htm
•(e.g., Costa Rica requires a "research passport' like a collecting permit!)

Online: Department of State - *Marine Science Research Application Tracking System* -RATS.
http://www.state.gov/e/oes/ocns/opa/rvc/index.htm
http://www.state.gov/e/oes/ocns/opa/rvc/rats/index.htm
This gives the embassy direct access to the application and supplemental information making it easier to forward information to the Foreign Ministries.

Science party needs passports & visas (check on work visas).

Work closely with ship agents. They can help with gear shipment, ground transportation, customs agents, obtaining last minute supplies, etc.

- Space for 1-2 foreign observers is almost always required by host country – best if they can also collaborate.
- Identify port and scope out issues (agents, chemicals, cranes, access etc.)
- Develop local collaborators whenever possible.
- Data sharing agreements
- Shipping and Customs (detailed info – serial numbers, values, wts)
- Visa Requirements - Passport expiration dates.
- Leaving and returning to a foreign country

Exploring the Deep Ocean

NATIONAL DEEP SUBMERGENCE FACILITY VEHICLES

Alvin

Human Occupied Vehicle

Accommodates:
1 Pilot and 2 Scientists

Depth Capability:
Phase 1: 4500m
Phase 2: 6500m

Sentry

Autonomous Underwater Vehicle

Depth Capability:
6000m (20,000 feet)

Jason

Remotely Operated Vehicle

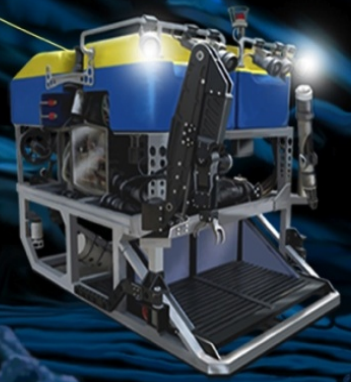
Depth Capability:
6500m (21,450 feet)

ALVIN – HOV
4500 m

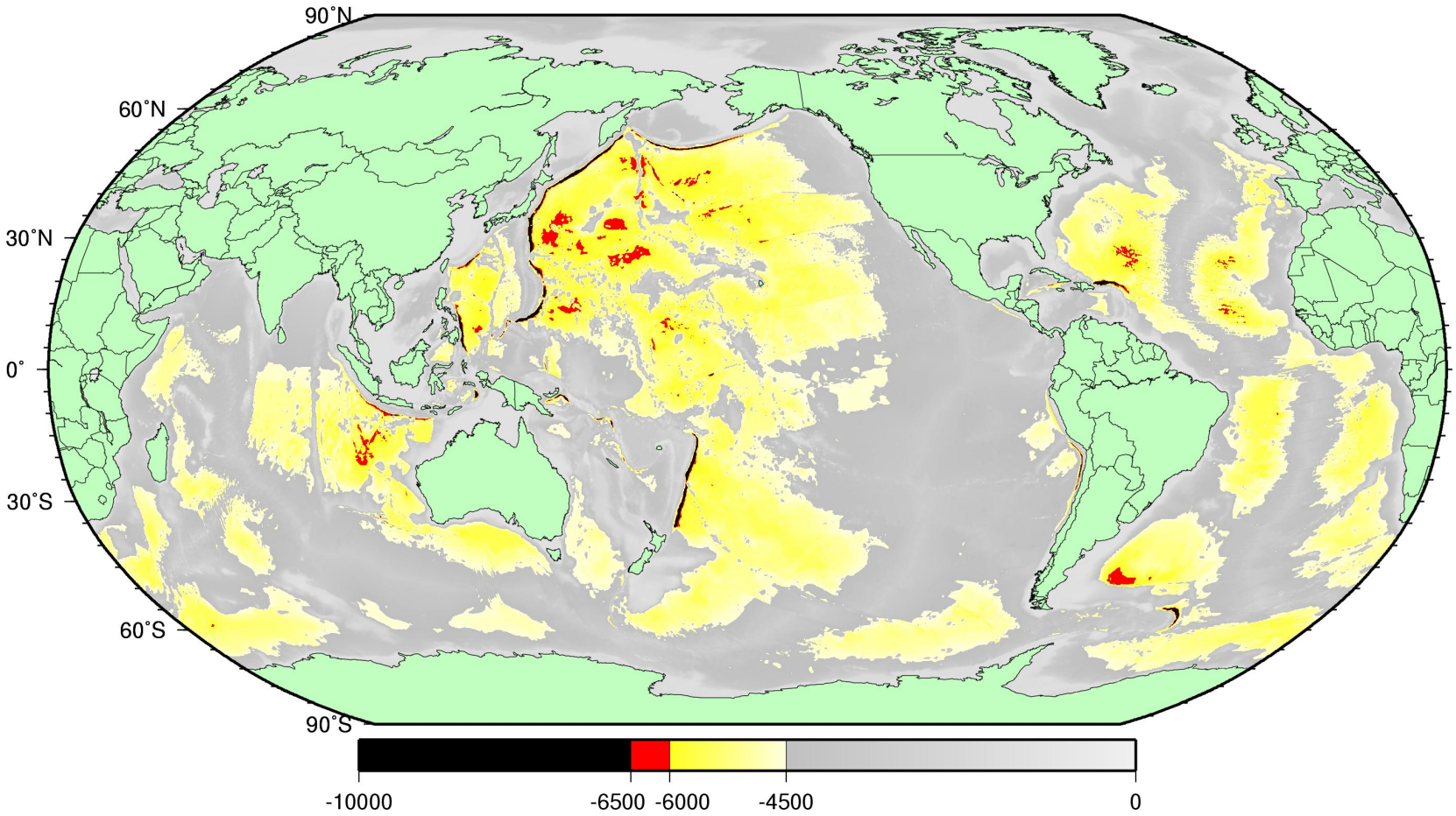
Medea

SENTRY –AUV
6000 m

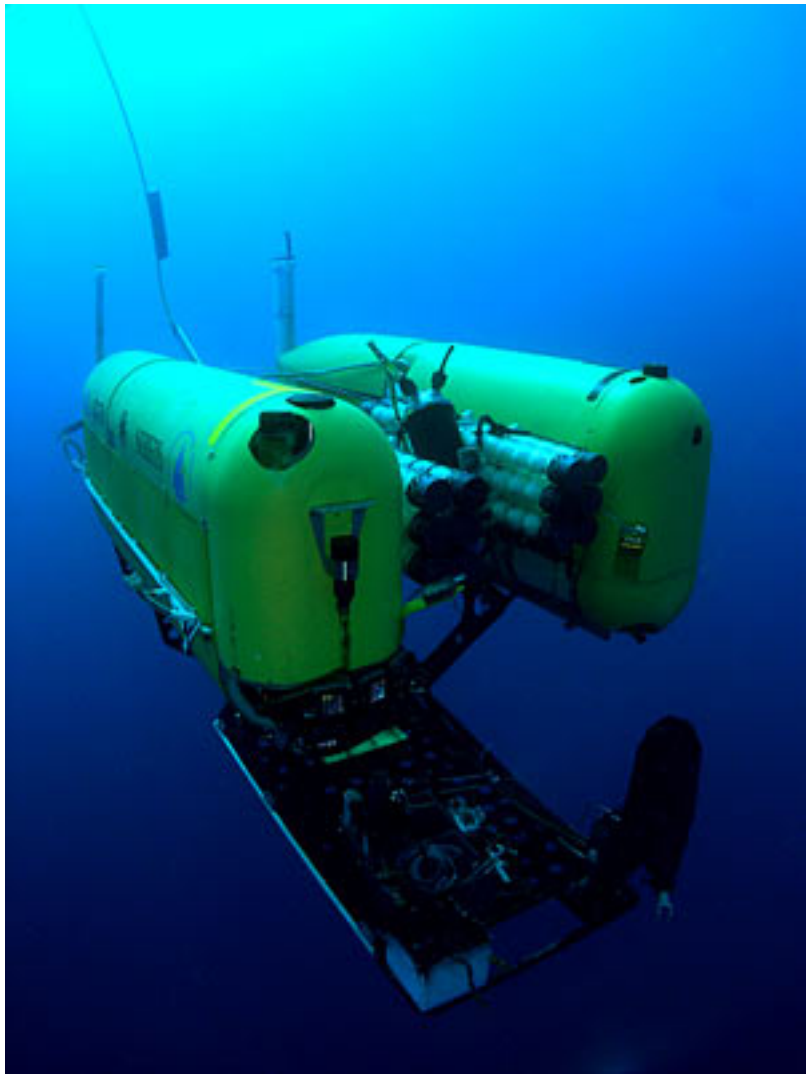
JASON – ROV
6500 m



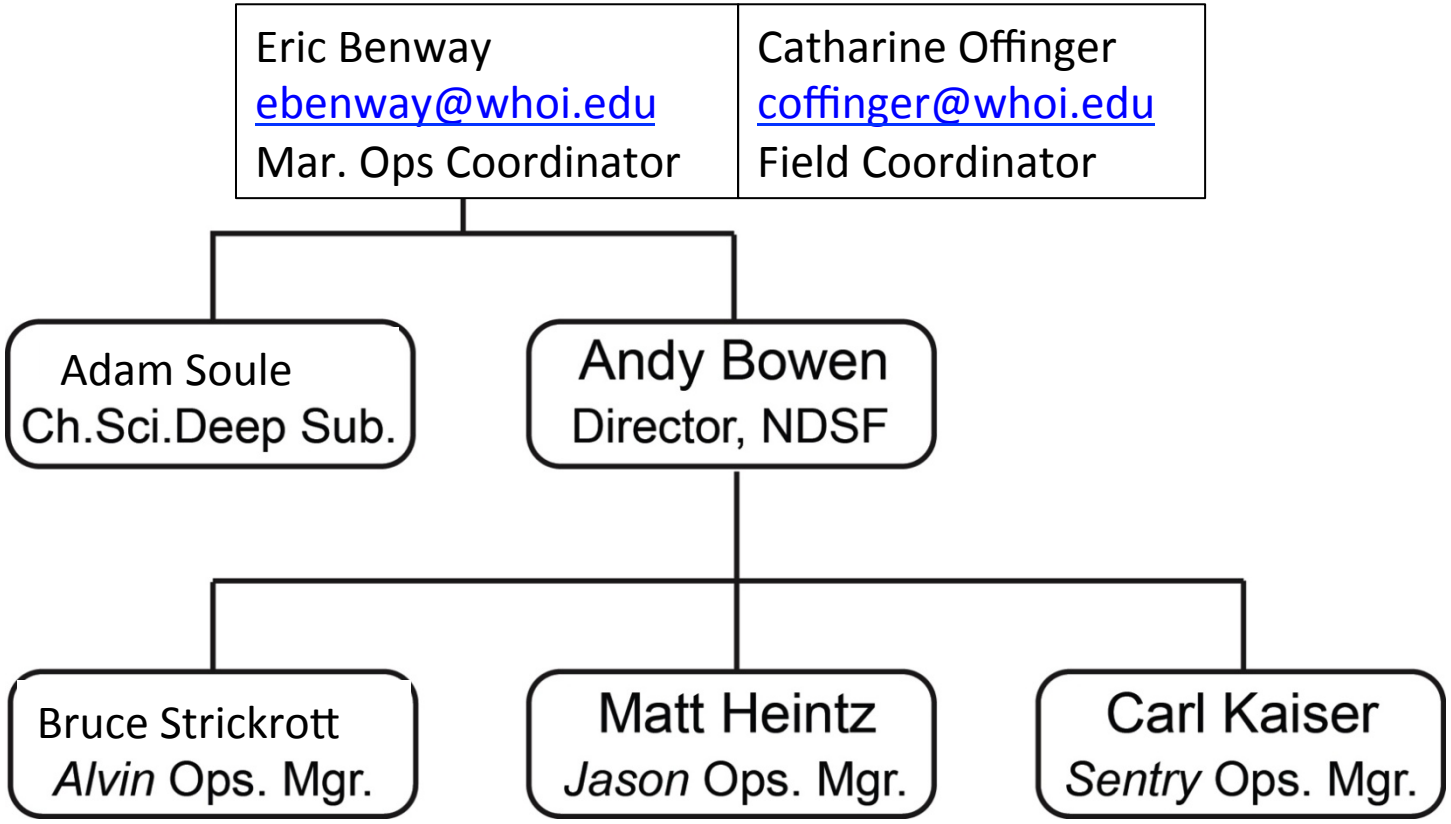
Alvin can reach 65% of seafloor
Jason and Sentry reach 98%



Nereus – Hybrid ROV/AUV
Full ocean depth capability



Don’t hesitate to talk to the ops manager – when preparing proposals or planning cruises



RICK CHANDLER – Sub Ops Admin

ALVIN Refit
2013

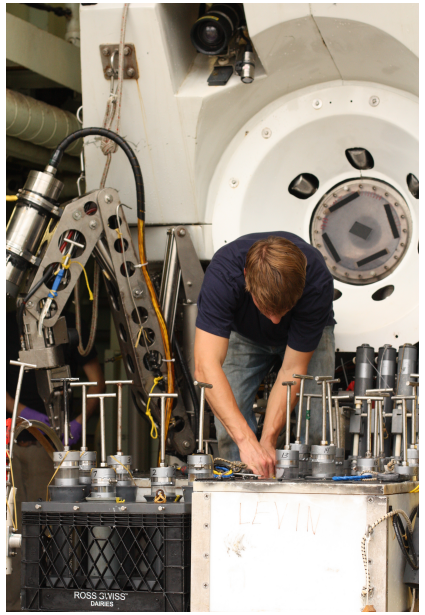
HOV

- 2 scientists + 1 pilot (6-10 hr down)
- Speed 1 knot, 5 mile range
- 5 Viewing Ports, 2 manipulators
- Science basket payload: 200 lbs-
- Primary science cameras (2): 2 MPix/HDTV CMOS color zoom
- Manipulator-mounted camera: 12 MPix/ HDTV hybrid digital still/video
- Optional mapping sensor: Reson 7125 multibeam system

Jason ROV

- On bottom speed 0.1-0.4 knots
- Descent/Ascent 30 m/min
- 8 video channels,
- 6 video + 1 still camera
- Payload 350 lbs,
- Two manipulators
- Sample storage drawers

Alvin and *Jason* Equipment



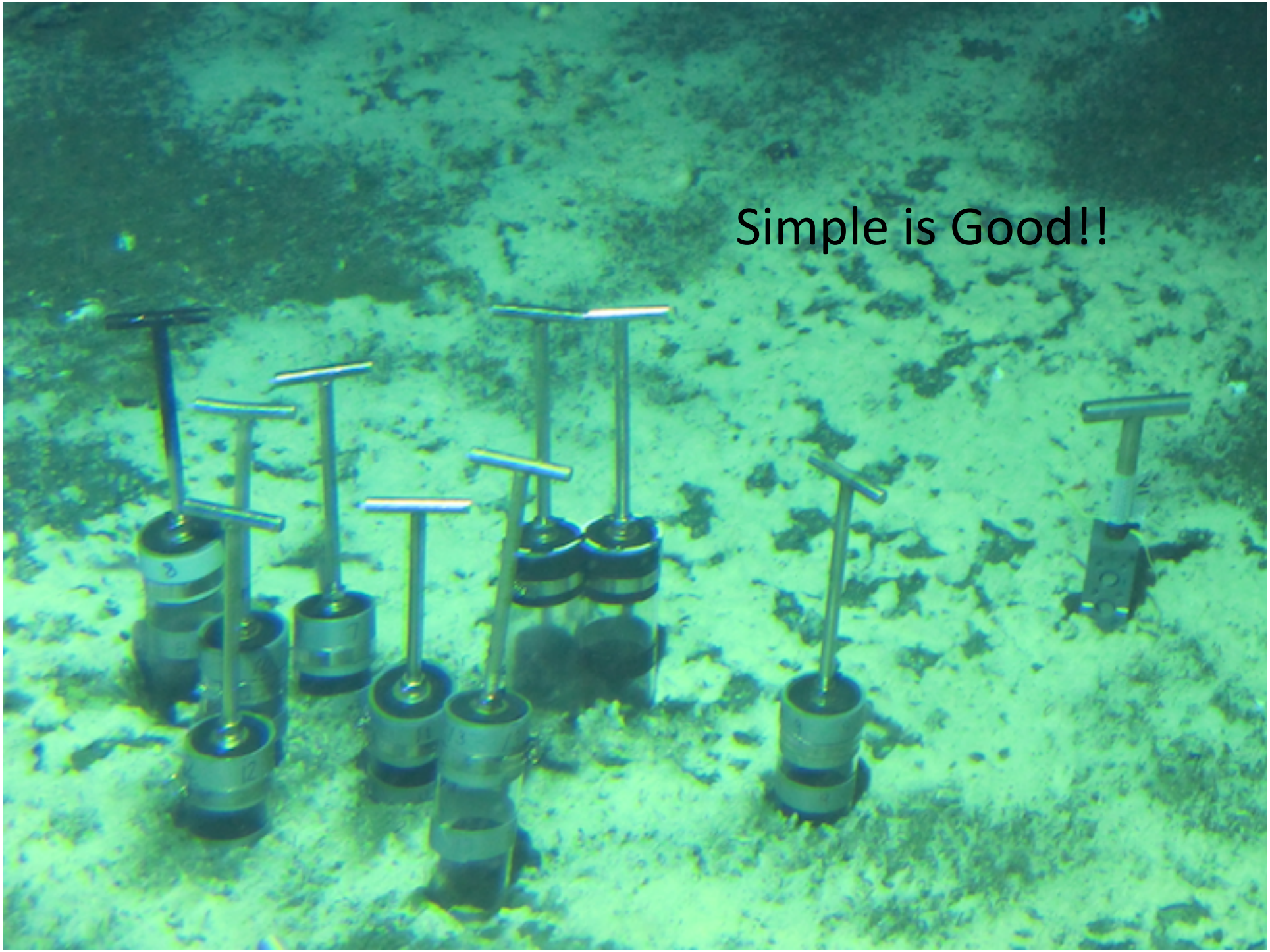
Profiling Sonars
Reson Multibeam Sonar
Imagenex Profiling Sonar
CTFM Scanning Sonar
Tritech Dual Frequency Scanning Sonar

Temperature Devices
High and Low Temperature Probes
ICL Temperature Probe
Heat Flow Probes

Sample Storage Equipment
Biological Sample Boxes (various sizes)
Custom Science Baskets

Sampling and Data Collection
Magnetometer
Major Titanium Water Samplers
Niskin Bottles
Portable CTD
Push Cores
Scoop Nets
Small Capacity Slurp Samplers
Large Capacity Slurp Samplers
Hydraulically-Driven Slurp

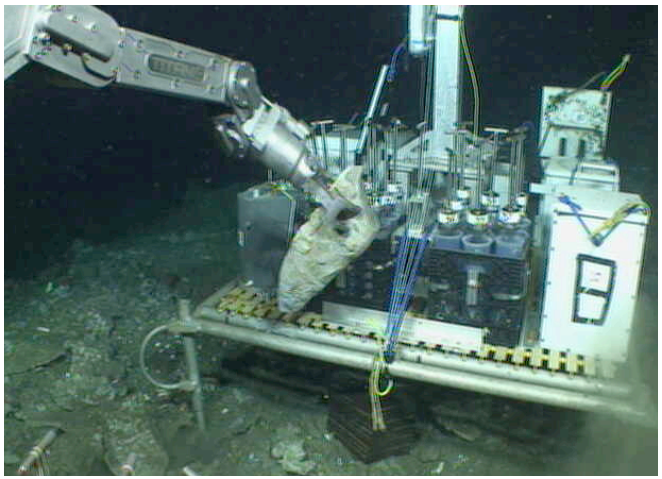
Navigation
Long-baseline, Doppler, USBL

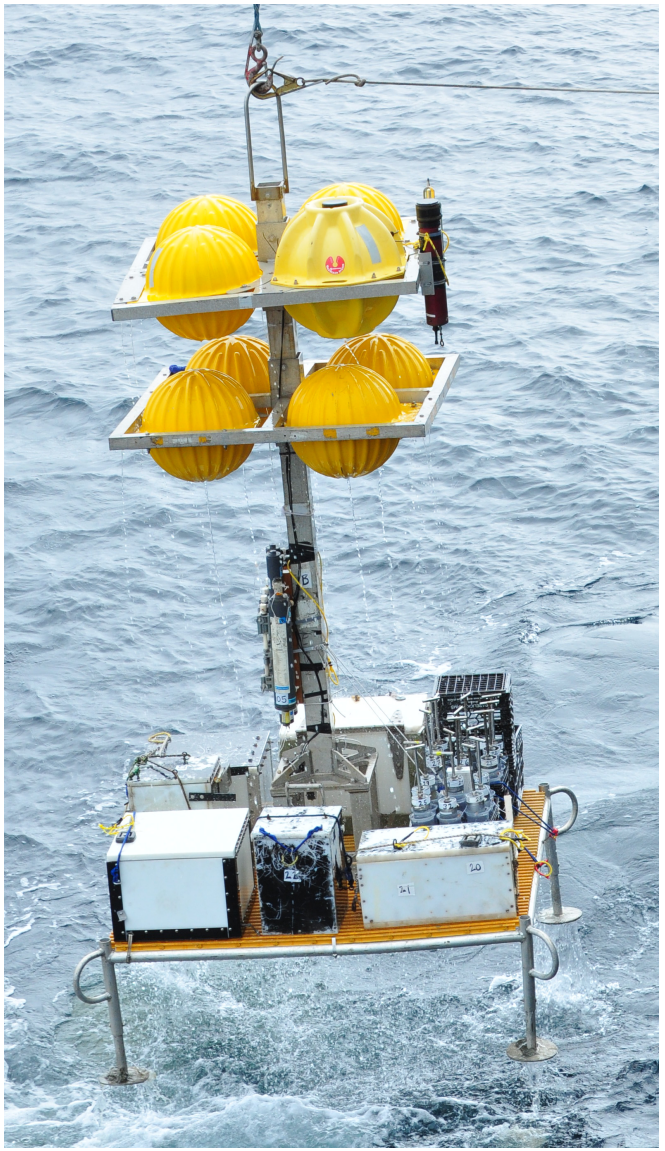

Simple is Good!!

A **gear elevator** can maximize efficient use of dive time

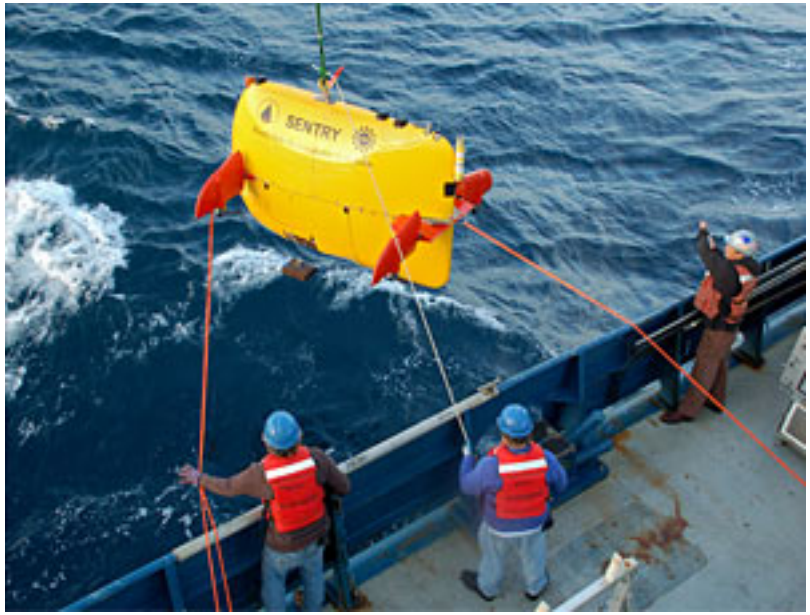
Best results when:

- Sites are < 1000 m (but not essential)
- Minimal or Predictable Currents
- Fixed work sites or limited traversing
- Extensive Sample collection is required



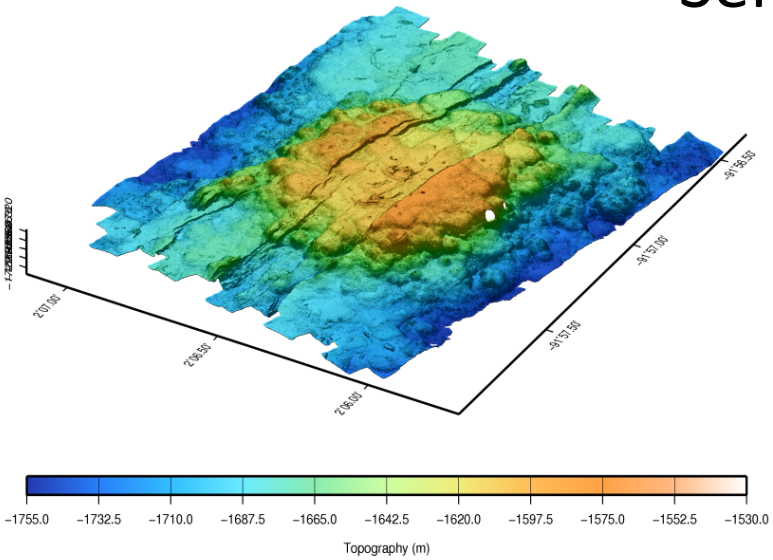


Sentry - AUV

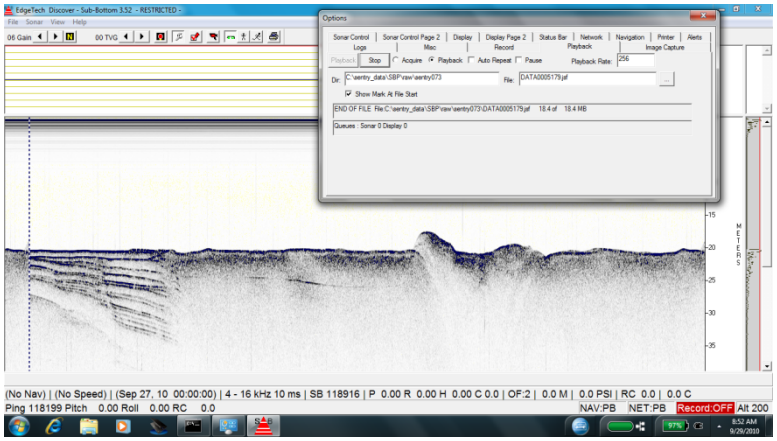


- Untethered, autonomous, up to 2.3 knots
- Primarily preprogrammed, some adaptive surveys
- Precisely navigated (USBL, LBL)
- Geophysical survey: multibeam sonar, sidescan, subbottom
- CT, Eh, optical backscatter, fluorometers, mass spectrometer
- Photo surveys: digital camera, 3D reconstructions
- Low bandwidth acoustic communication allowing:
  - Vehicle status
  - Snippets of science data
  - Mission reprogramming

Sentry mapping

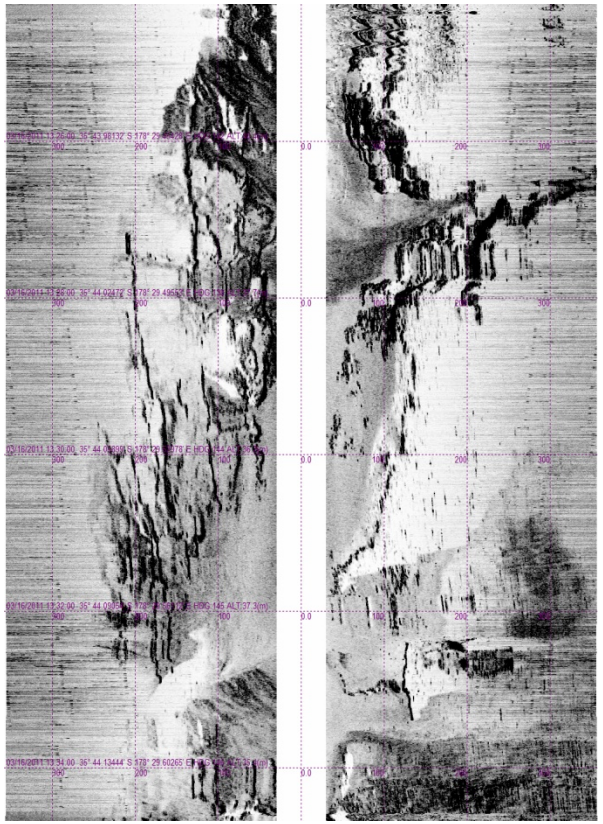


Multibeam Survey, Sinton/White 2010

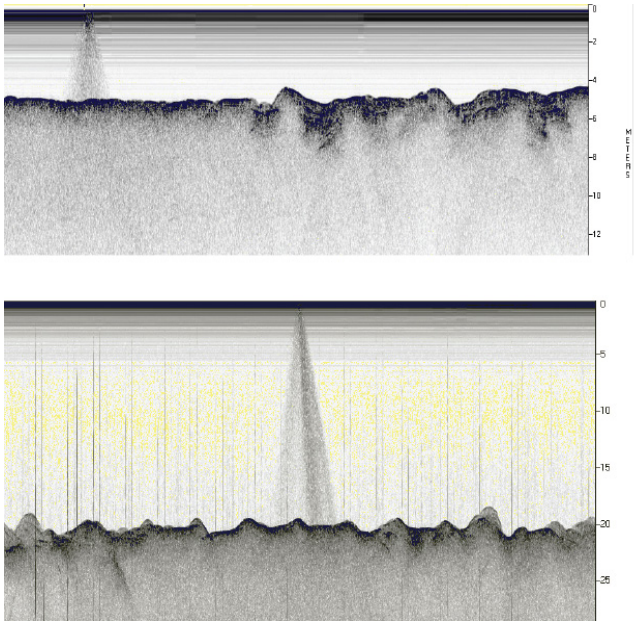


Subbottom Profiler,
Boetius/German 2010

Sidescan Survey
(de Ronde, 2011)

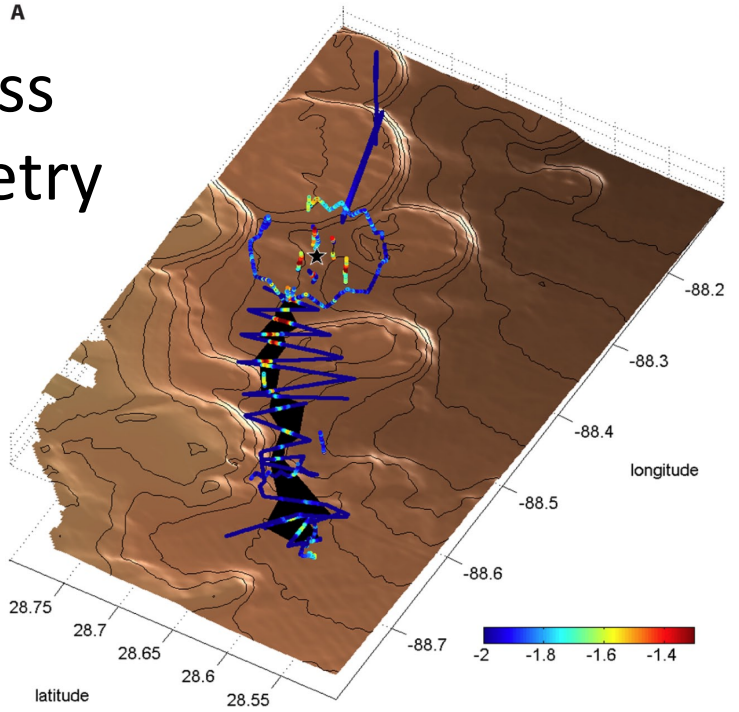


Water Column Mapping



In-situ Mass Spectrometry

Oil spills



SM 2000 Multibeam

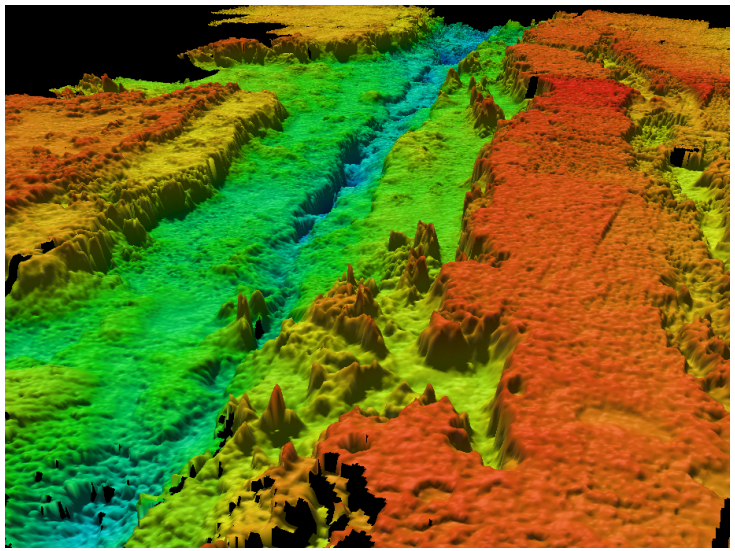
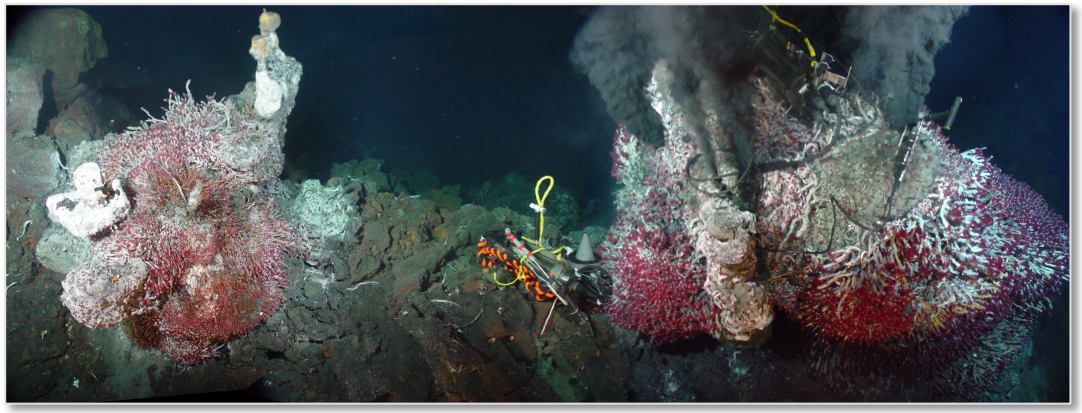


Photo Mosaics



Using Deep-Submergence Assets

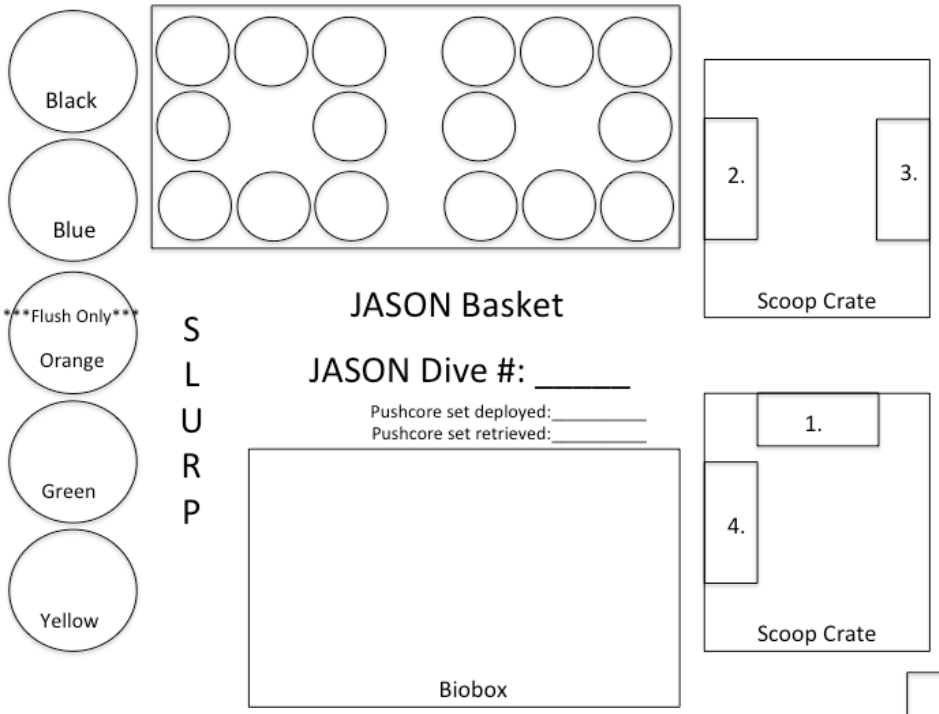
BEFORE THE CRUISE

- Ship time request/scheduling
- Extended mobilization time, dive checkout
- Dive planning – know vehicle recovery and turnaround times, gather maps and data
- Watches and duty assignments
- Berthing spaces - know deep submergence group sizes, fill all berths
- Gear elevators can optimize your dive time
- Sampling equipment – Operations vs Scientist- provided
- Go to sea and try out vehicles before you lead your own cruise.
- Develop weather-related backup plans (take extra over the side equipment).
- Invite knowledgeable guest scientists

Using Deep Submergence Assets

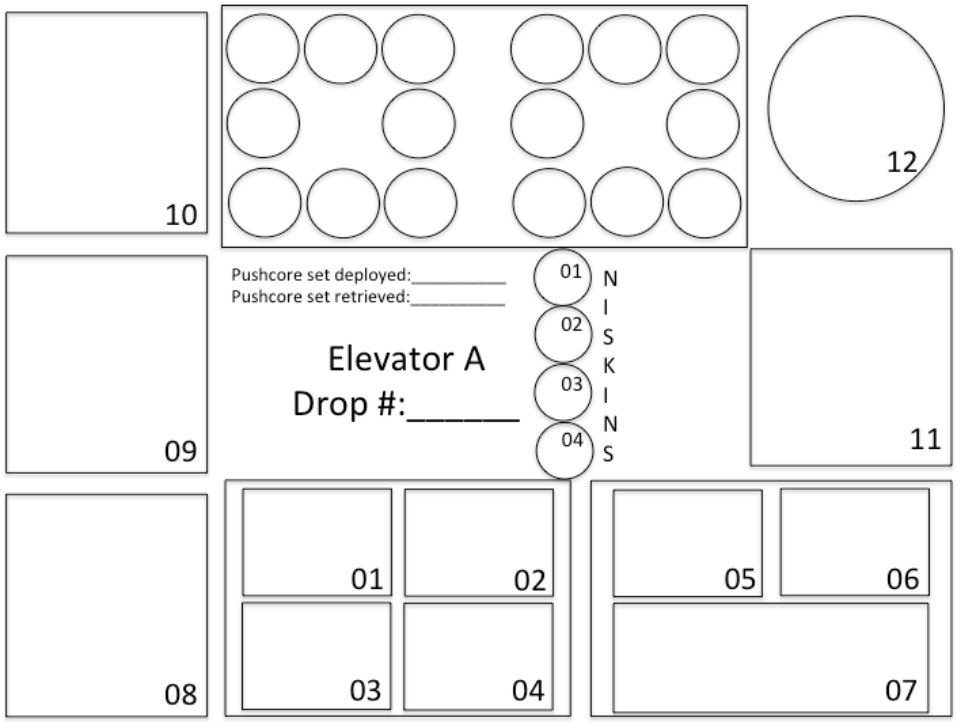
AT SEA

- 24 h ship use:
  -Shifts and watches
  - juggling crew & staff needs
  - Know ROV/SUB refit and charging time
- Daily planning meetings
- Assign responsibilities for each major task
- Basket setup /payload – create basket map
- Using ship tools for planning dives – ADCP, XBT, multibeam
- Carefully consider imagery needs (video vs frame grab vs still photography)
- Organizing dives and assigning dive slots
  - Agree on cruise priorities before sailing
  - Do the most important work first



Jason Basket Map

Elevator Map



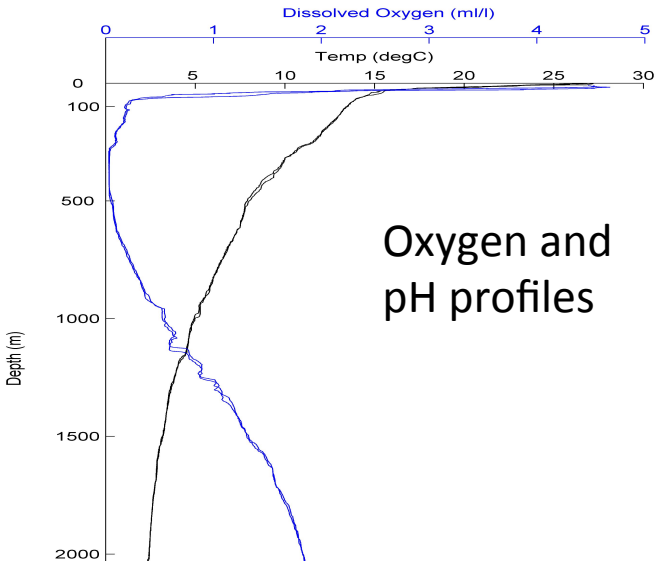
Sample Watch Assignments

	AT 18-10				
	Rathburn -1; Levin - 2, Rouse - 3, Orphan 4				
DAY		12AM to 6 AM	6 AM to 12 PM	12 PM to 6 PM	6 PM to 12 AM
Sept. 1	Lead (PI)	Rathburn	Levin	Rouse	Orphan
	Recordkeeper (Experienced)	Andrew Thurber	Elena Perez	Anne Dekas	Nerida Wilson
	Video grab/annotation/gopher	Elizabeth Reichert	Marie Nordström	Ron Taylor	Abbie Saxena
	Elevator/Deck/Jason - A	Josh Steele	Josefin Stiller	Ally Pasulka	Ashley Burkett
	Elevator/Deck/Jason - B	Kirk Sato	Jen Glass	Caitlin Feehery	Christina Smith
Sept. 2	Lead (PI)	Rathburn	Levin	Rouse	Orphan
	Recordkeeper (Experienced)	Anders Waren	Anne Dekas	Ally Pasulka	abbie (1)
	Video grab/annotation/gopher	Jeff Marlow	Kirk Sato	Jen Glass (3)	Christina Smith
	Elevator/Deck/Jason - A	Alex Hangsterfer	Marie Nordström	Elizabeth Reichert	Jen Glass
	Elevator/Deck/Jason - B	Andrew Thurber	Caitlin Feehery	Ron Taylor	Josh Steele
Sept. 3	Lead (PI)	Rathburn	Levin	Rouse	Orphan
	Recordkeeper (Experienced)	Anne Dekas	Josh Steele	Abbie (1)	Ally Pasulka
	Video grab/annotation/gopher	Alex Hangsterfer	Elizabeth Reichert	Marie Nordström	Nerida Wilson
	Elevator/Deck/Jason - A	Ben Grupe	Elena Perez	Anders Waren	Jen Glass
	Elevator/Deck/Jason - B	Caitlin Feehery	Kirk Sato	Jeff Marlow	Ashley Burkett
Sept. 4	Lead (PI)	Rathburn	Levin	Rouse	Orphan
	Recordkeeper (Experienced)	Ben Grupe	Elena Perez	Josh Steele	Anne (3)
	Video grab/annotation/gopher	Josefin Stiller	Kirk Sato	Ron Taylor	Elizabeth Reichert
	Elevator/Deck/Jason - A	Abbie Saxena	Anders Waren	Andrew Thurber	Christina Smith
	Elevator/Deck/Jason - B	Alex Hangserfer	Jeff Marlow	Caitlin Feehery	Marie Nordström
Sept. 5	Lead (PI)	Rathburn	Levin	Rouse	Orphan

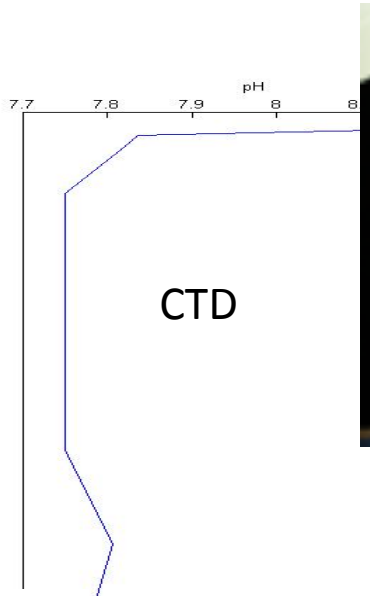
Responsibilities at Sea		**AT 18_10**	**Aug. 31-Sept. 8**
JASON		**PRIMARY**	**SECONDARY**
Dive Plan		Levin/Rouse/Orphan/Rathburn	
Event Log		Levin/Rouse/Orphan/Rathburn	ALL Record Keepers (Van Slot 2)
Elevator and Basket Map		Burkett/Nordstrom/Wilson/Steele	Deck Personnel (Slots 3, 4)
Prep: Rock and Bio Boxes		Thurber/Tayor/Waren/Marlow	Deck Personnel (Slots 3, 4)
Prep:Tube cores, Scoops, Slurps		Green/Smith/Feehery/Hangsterfer	Deck Personnel (Slots 3,4)
Niskin Water Samplers/Log		Pasulka/Steele/	Glass/Sato
JASON Clipboard Setup		Nordstrom/Perez/Wilson/Burkett	Pasulka/Feehery/Green
JASON COLONIZATION/ROCK LOG		Grupe/Perez/Glass/Hangsterfer	Deck Personnel (Slots 3, 4)
Post Recovery Sample Fate Log (non expt)		Feehery/Smith/Stiller/Perez	Perez/Smith/Burkett/Taylor/Bailey
Gear Elevator Setup		**Deck Personnel**	**Deck Personnel**
Photography		Rouse	Grupe/Burkett/Dekas
Fauna sorting (expts & other)		Levin	Levin group
Foram sorting (expts. Other)		Rathburn	Rathburn Group
Microbe Processing (expts. & other)		Orphan	Orphan Group
Reference Material/Genetics		Rouse	Rouse Group
ALTERNATE OPS			
CTD, Water		Pasulka	Steele/Thurber
CTD Log		Pasulka	Steele/Green
CTD Operations		Pasulka/Steele	Res Tech?/Thurber/Green
CTD download		Steele	Stiller/Sato/Burkitt
Multicore Drop Plan		Rathburn	Levin/Orphan
Multicore Setup		Rathburn/Taylor	Hangsterfer/Burkett/Sato
Multicore Sample Log		Burkett	Perez/Smith/Dekas
Multicore Processing		Taylor	Perez/Burkitt/Hangsterfer/Smith/Glass
Dive Tape Duplication			
Dive Reports = Event Log		Dekas	Nordstrom/Perez/Wilson

Plankton Sample		Grupe	Thurber/Sato
Seabeam surveys		Rathburn	Levin/Orphan

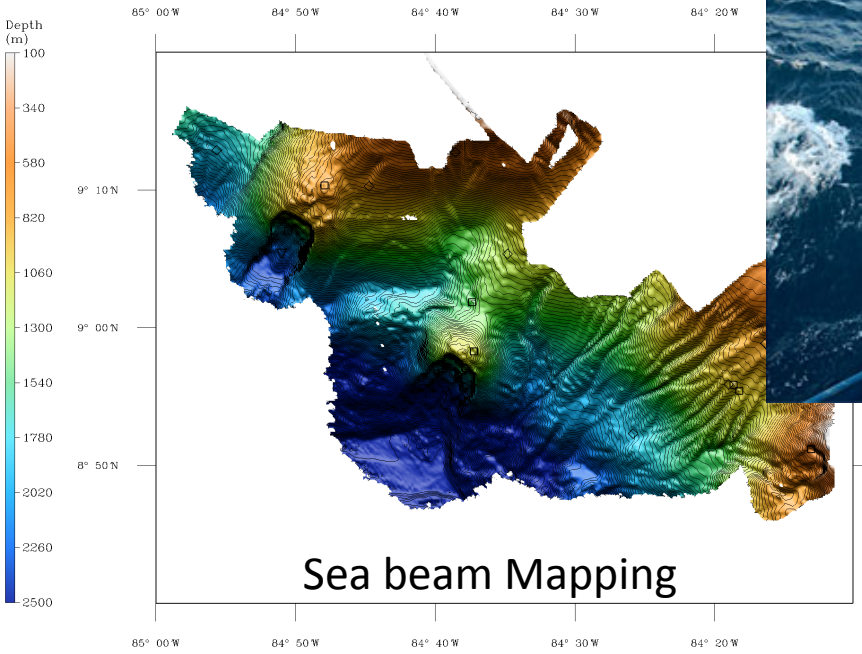
Night Ops for Submersible Ops



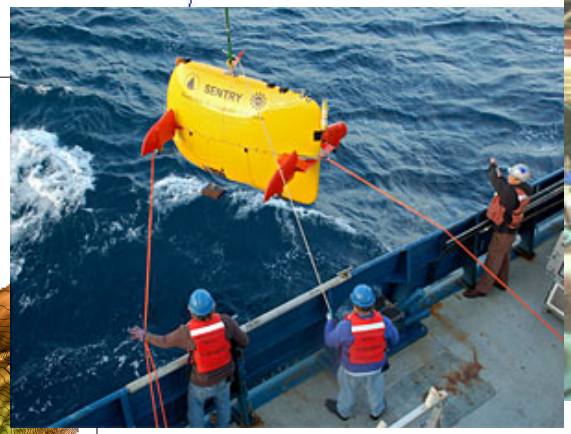
Oxygen and pH profiles



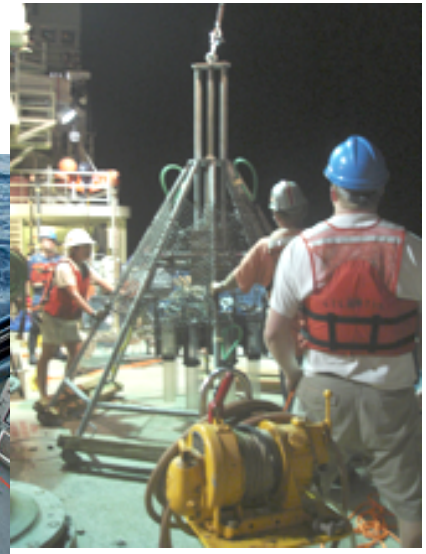
CTD



Sea beam Mapping



AUV ops



Multicoring

Using Deep Submergence Assets – More

- Understand transit speeds and stopping ability. Transects vs sampling tradeoffs. Use of lasers for scale.
- (e.g 0.5 to 1 knot; < 1 mab for photo transects; note camera orientation and use altimeter)
- Be mindful of damage – 3 D structures like corals or chimneys are fragile. Hot water is dangerous too.
- Manual vs automated imagery.
- Keep good records: cruise participants, instrument specs, laser distance, calibration info, navigation accuracy, imagery formats, data ownership, and rules , voucher specimens etc.

Some Philosophical Issues

- Be generous with dive time but don't sacrifice science
- Always put someone in charge who understands the science and priorities.
- Do as much student training as you can
- Engage foreign students and investigators whenever possible/relevant
- Make sure everyone understands intellectual boundaries, data sharing rules, and data embargos before leaving the ship
- Fill up the ship if you can.
- Give undergrads/underrepresented students opportunities

Enjoy the Experience!