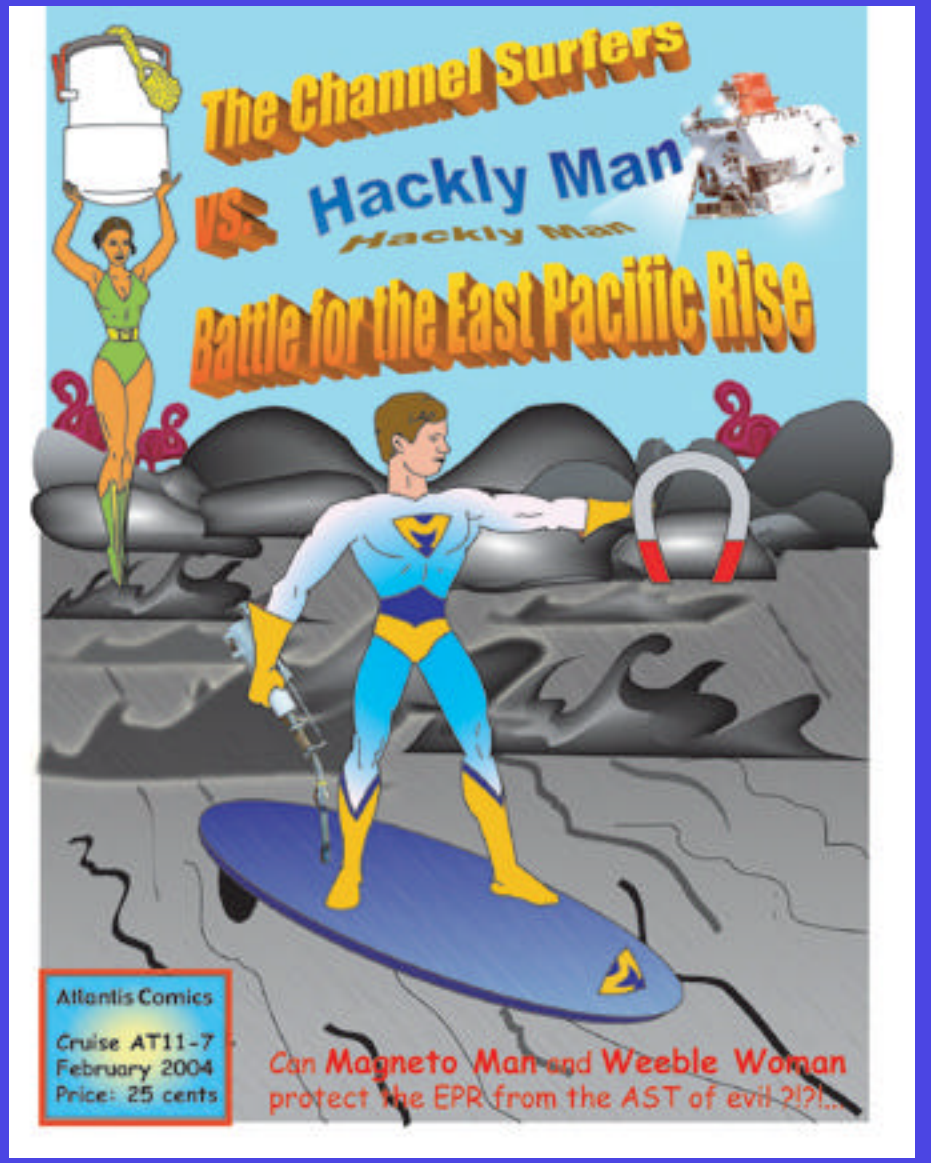
2004 ALVIN Science Programs

Schouten, Fornari, Tivey

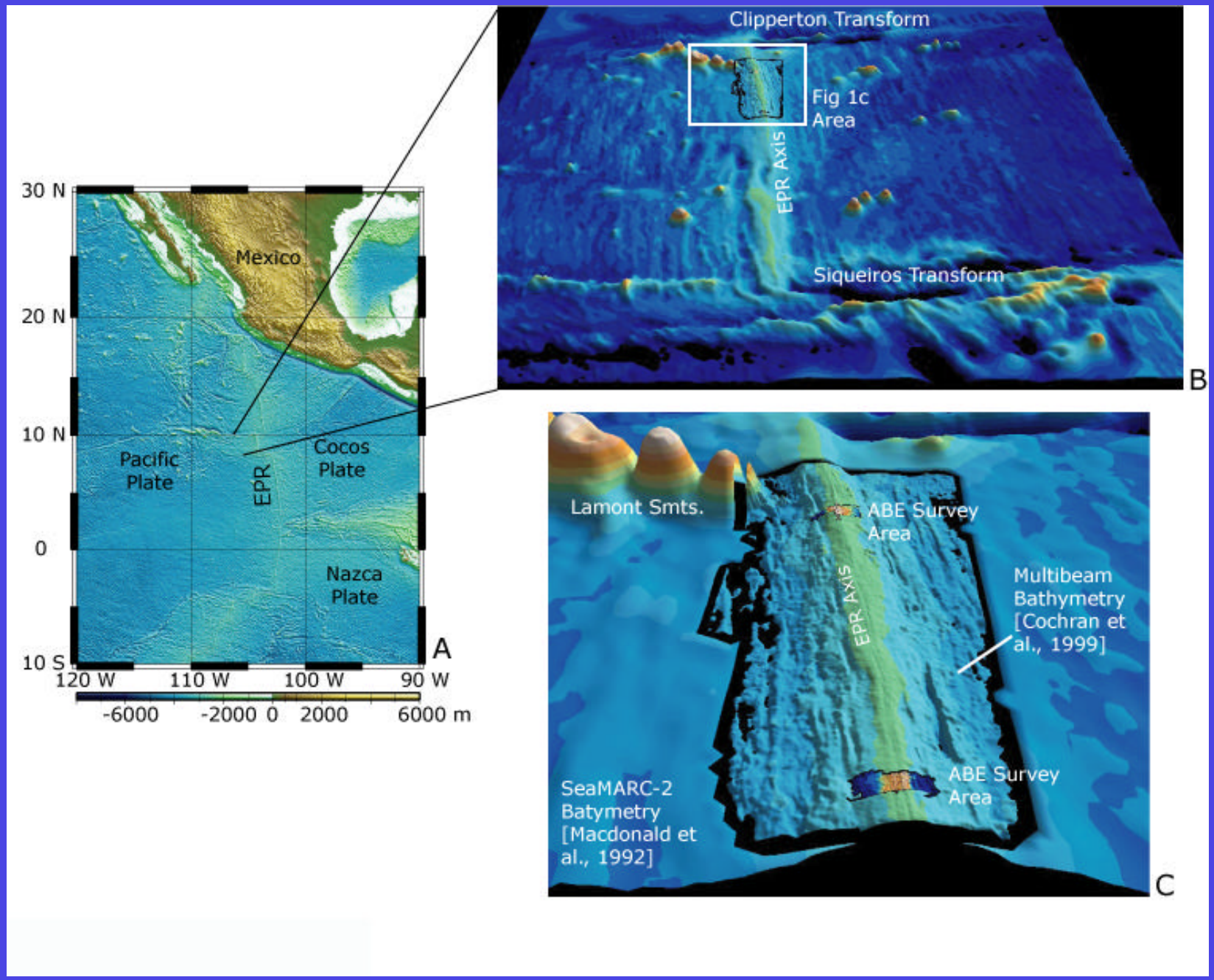
28 Jan – 24 Feb

Dan Fornari Presenter

AT-11-7 Cruise - EPR-CAMH 9° 25’-55’N - Jan-Feb, 2004



Schouten, Tivey, Fornari et al.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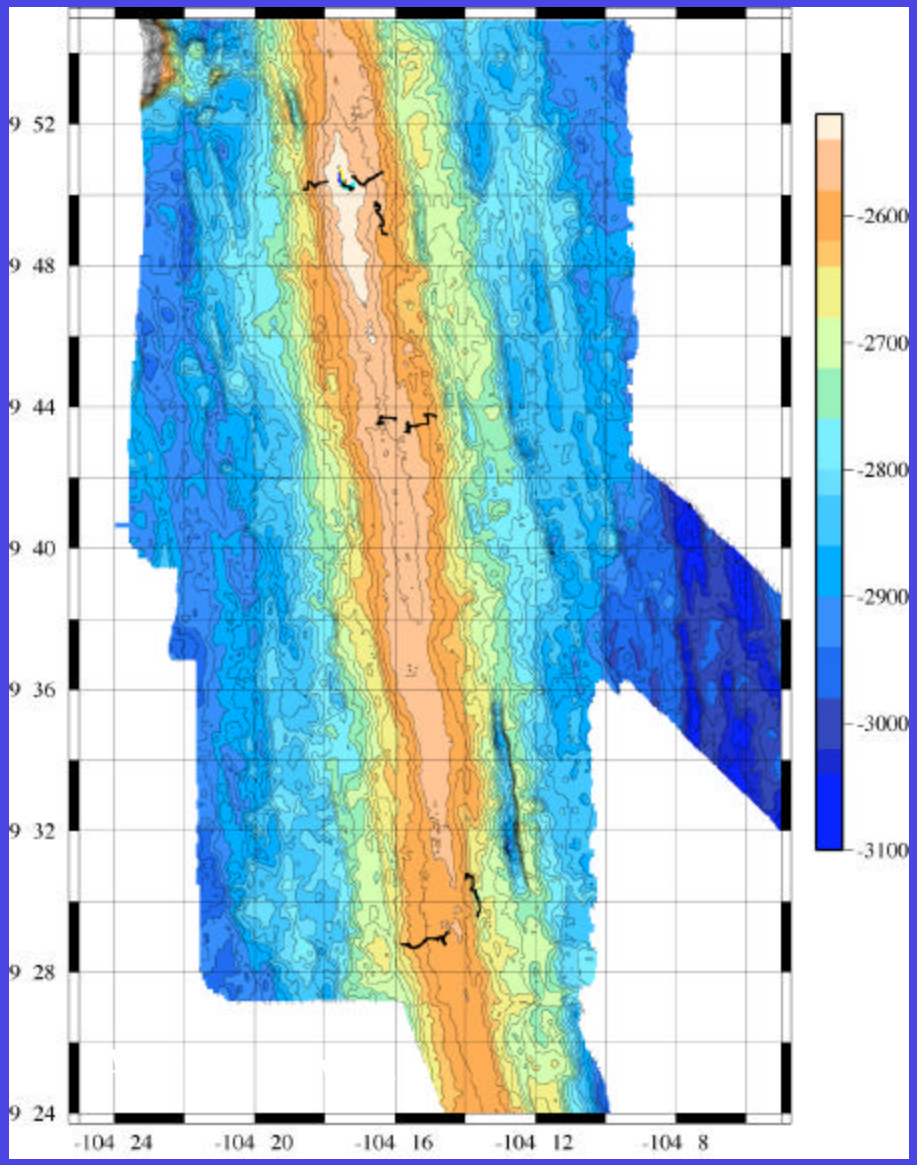
ABE Survey
Area
EPR Axis
Multibeam
Bathymetry
[Cochran et
al., 1999]
ABE Survey
Area
SeaMARC-2
Batymetry
[Macdonald et
al., 1992]
C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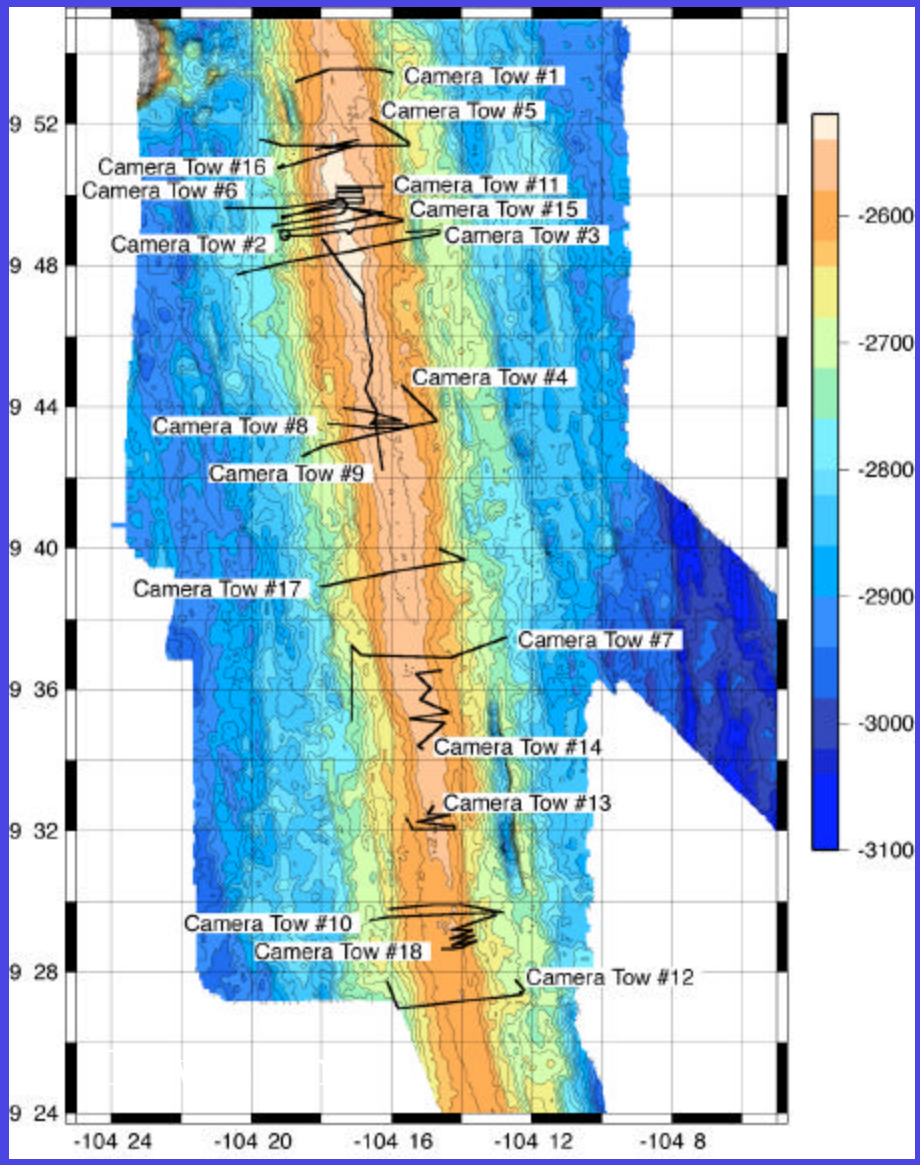
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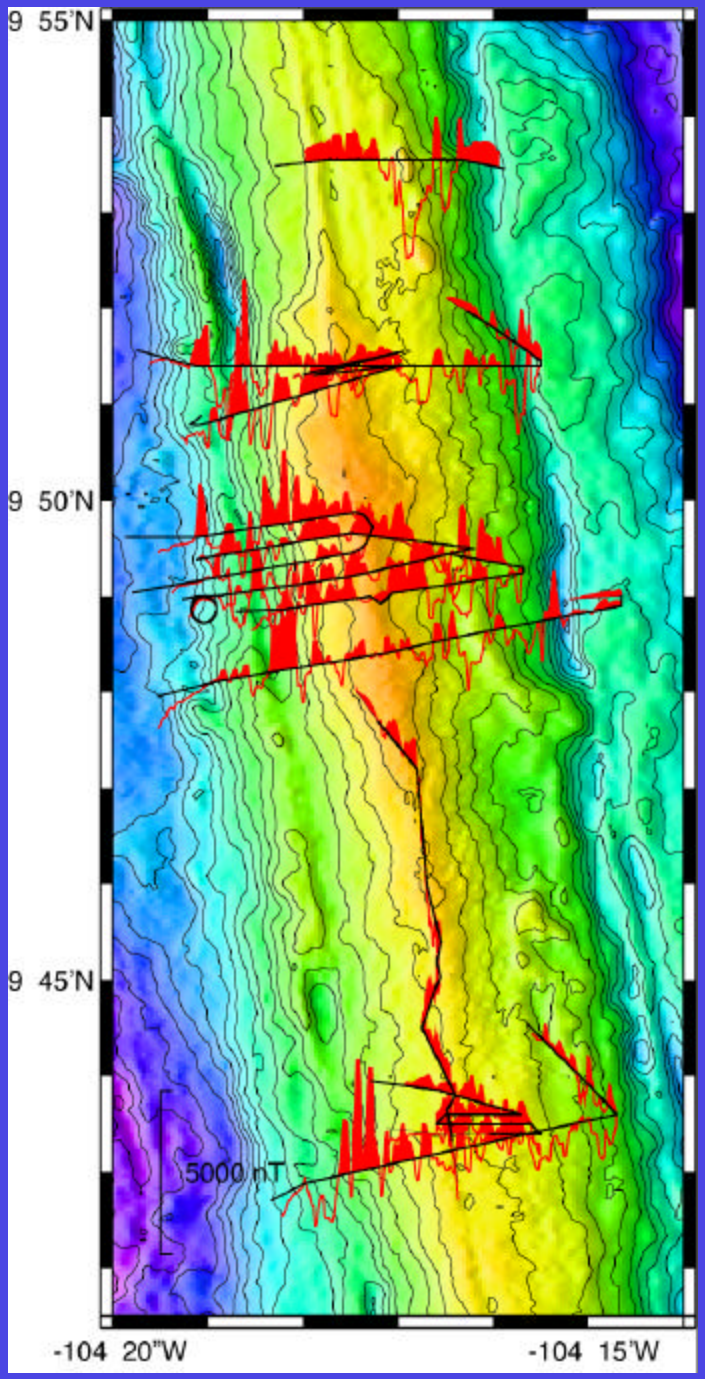
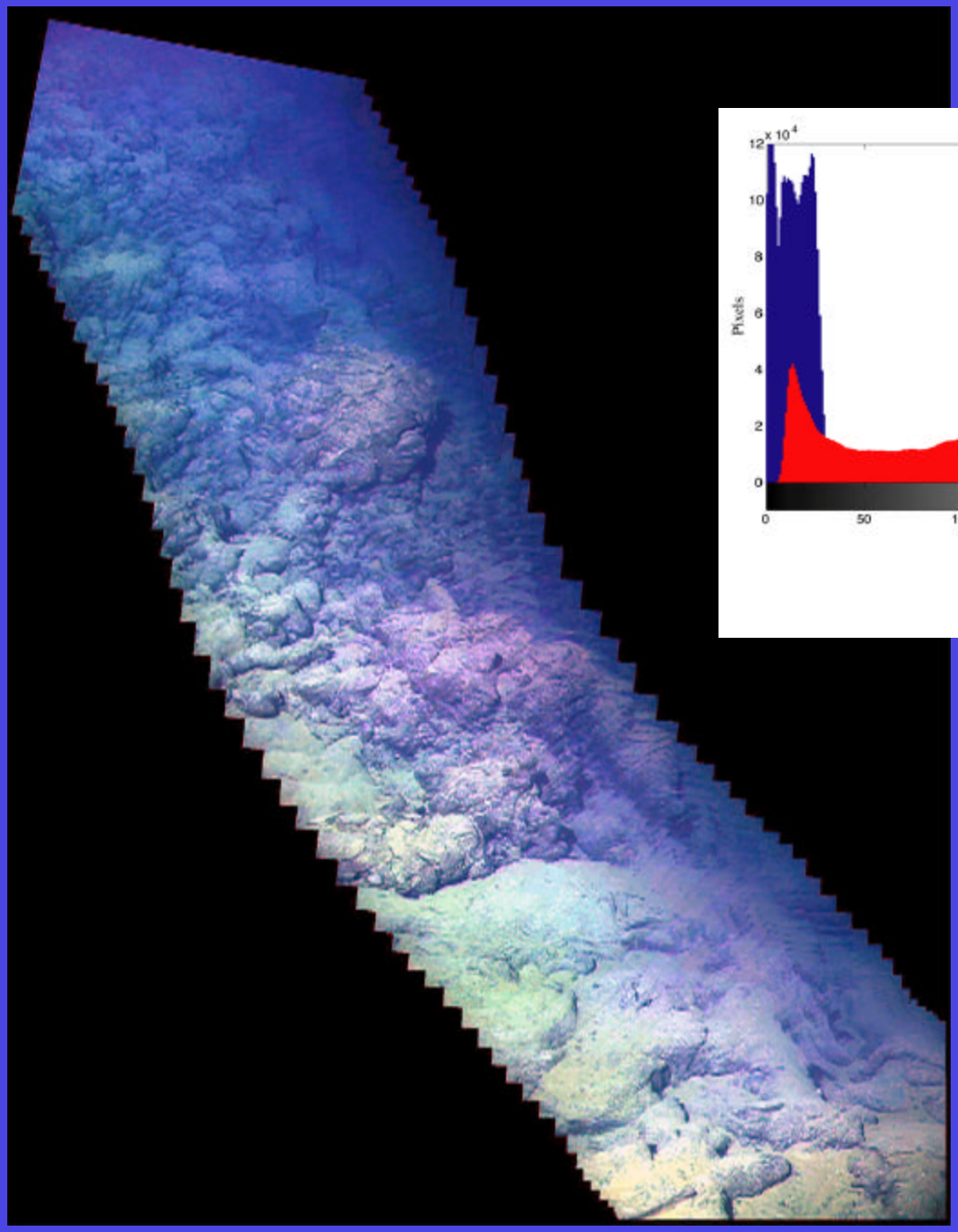
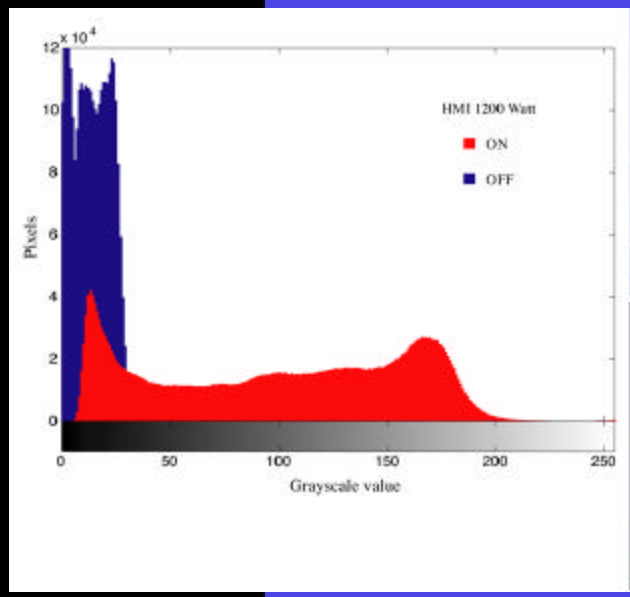

9 55'N
9 50'N
9 45'N
5000 nT
-104 20"W
-104 15'W

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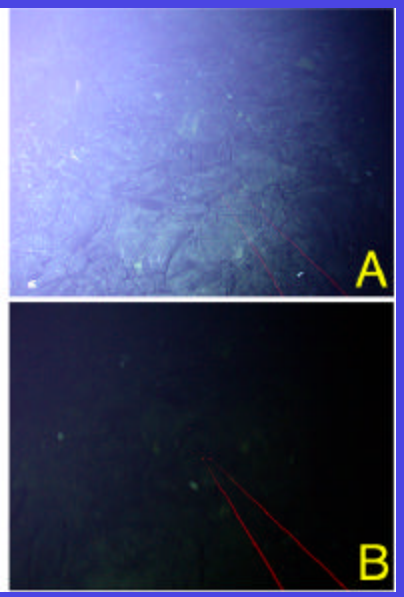
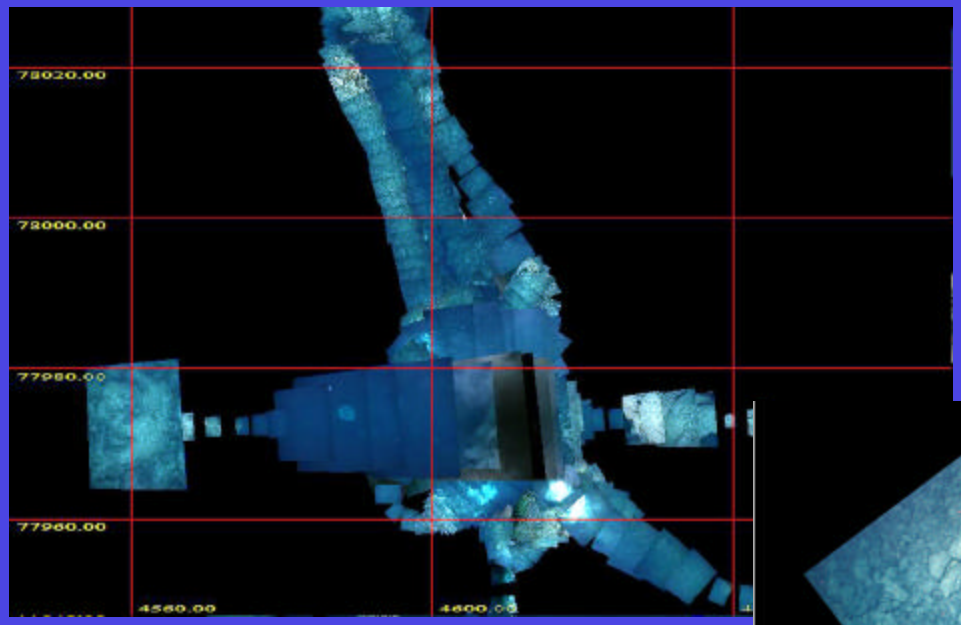

A
B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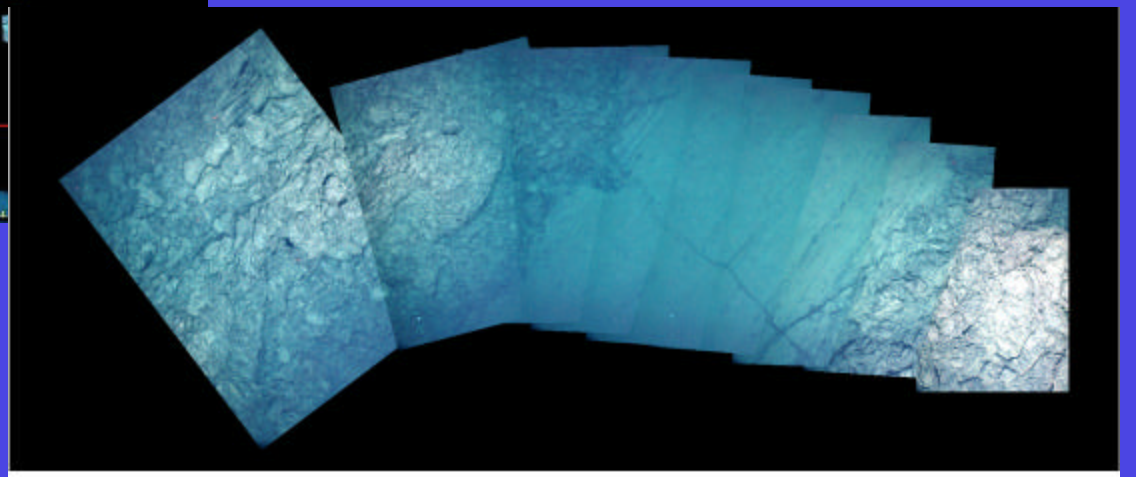

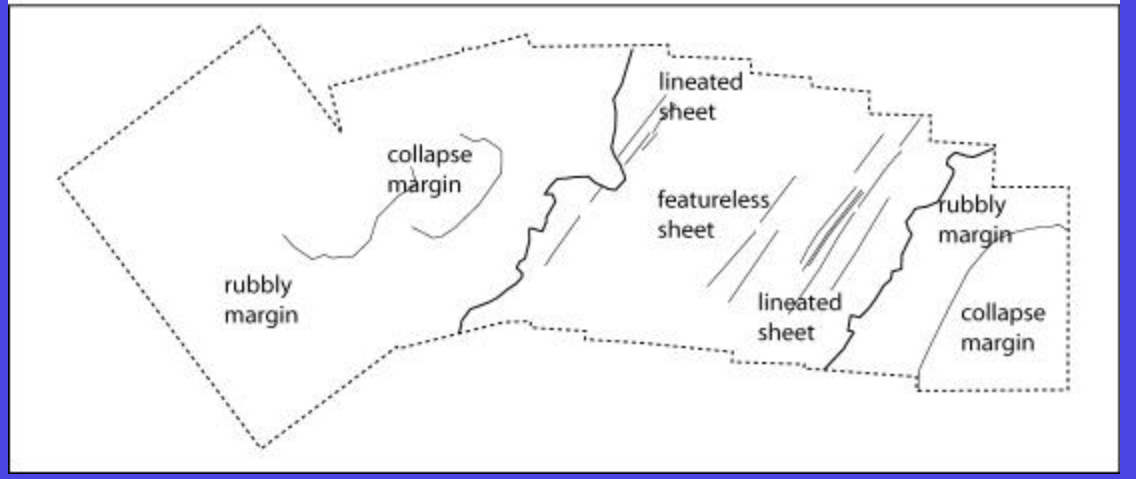
lineated sheet
collapse margin
featureless sheet
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rubbly margin
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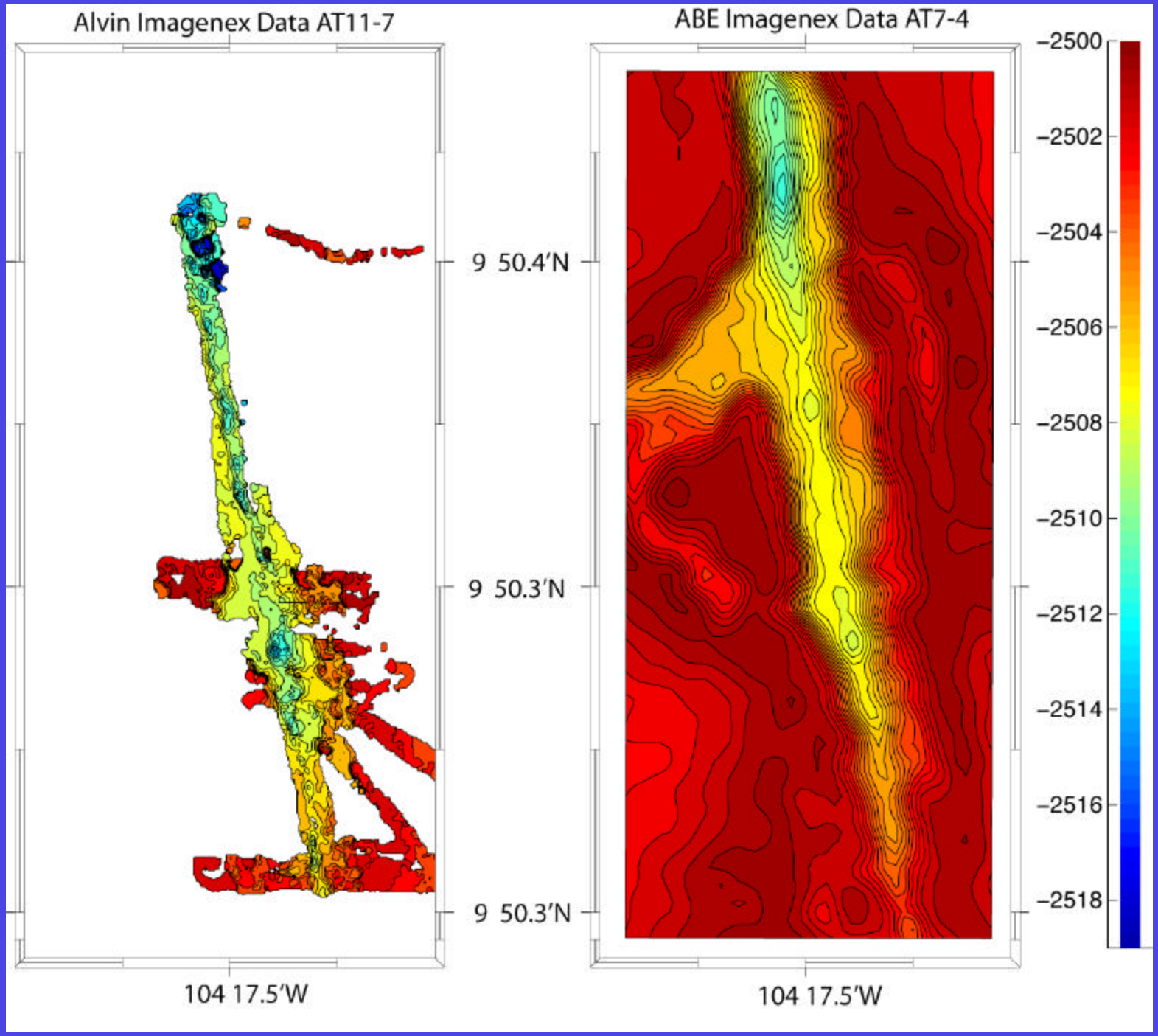
Alvin Imagenex Data AT11-7
ABE Imagenex Data AT7-4
9 50.4′N
9 50.3′N
9 50.3′N
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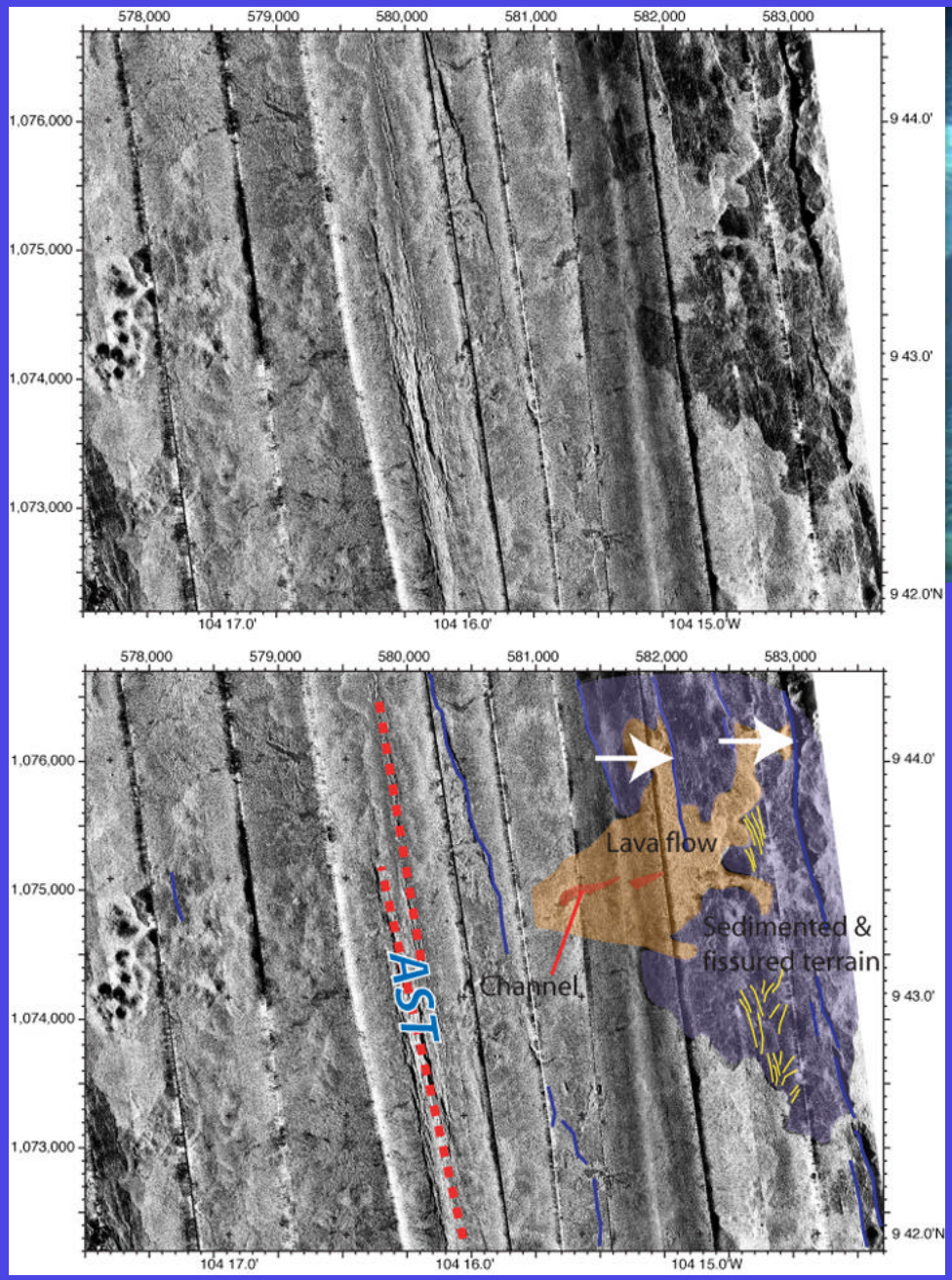
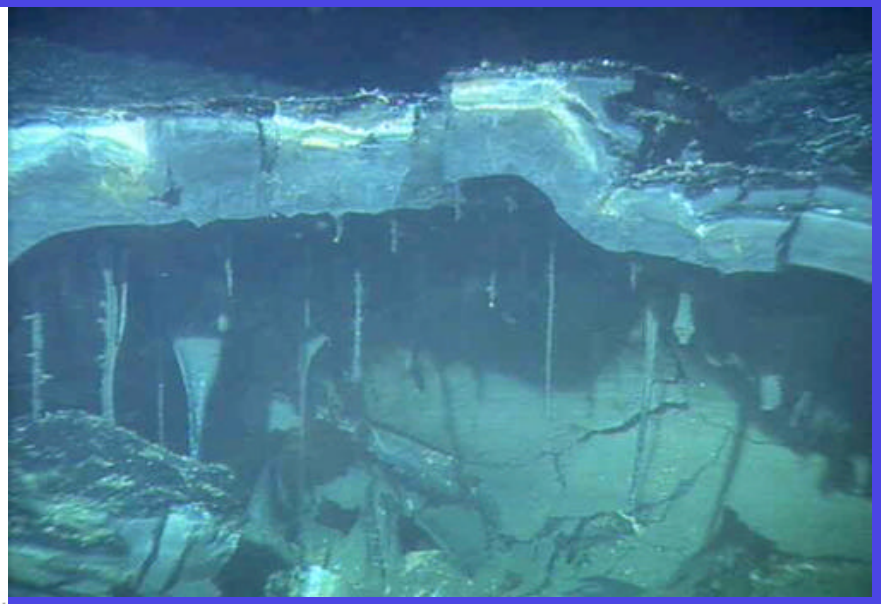




Posters on EPR cruise related Research - Monday Afternoon Ridge20000 Session:

Soule et al. **B13A-0166**

Ferrini et al. **B13A-0162**

Fornari et al. **B13A-0167**

Mayer et al. **B13A-0163**

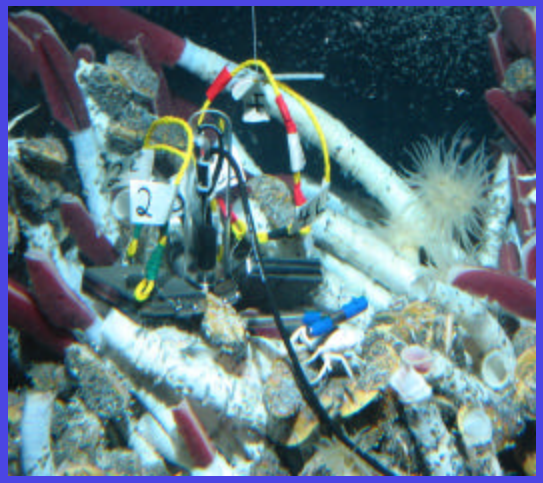
Tyler et al. **B13A-0161**

Seyfried
28 Jan – 24 Feb

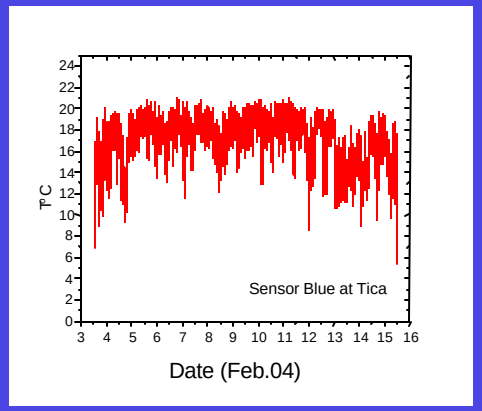
Seyfried Presenter

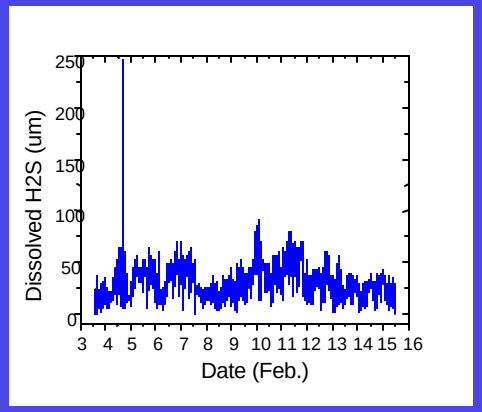
Time-series Deployment of Chemical Sensors at EPR 9°.50N (Cruise AT-11-7)

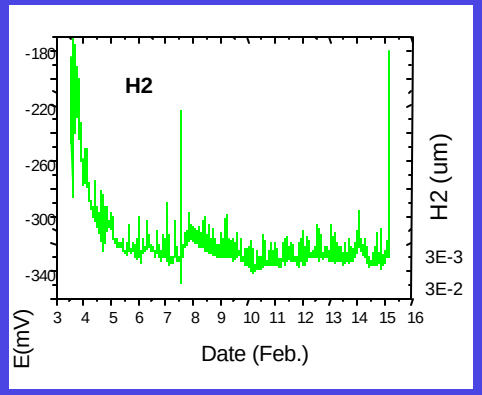
P.I's W. E. Seyfried, Kang Ding

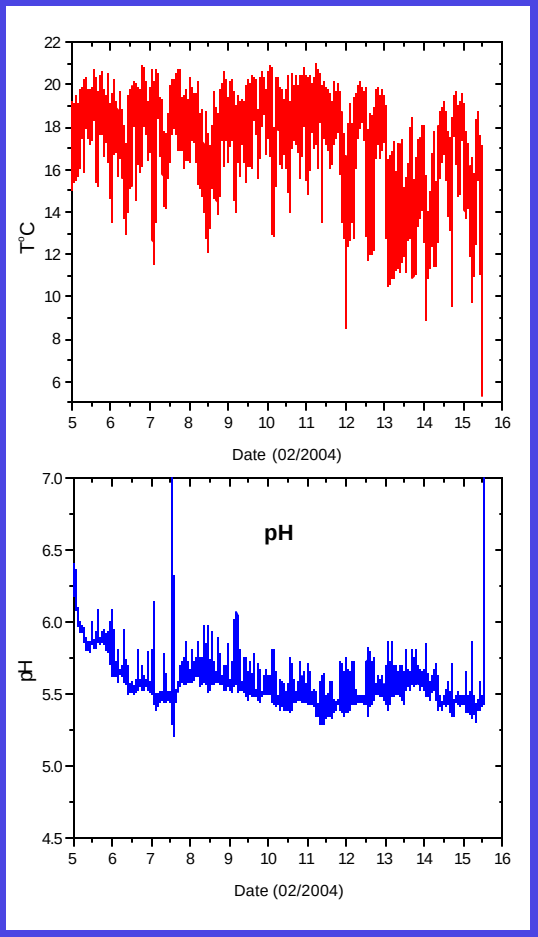


Collaborative experiments with
Tim Shank and Stace Beleaux

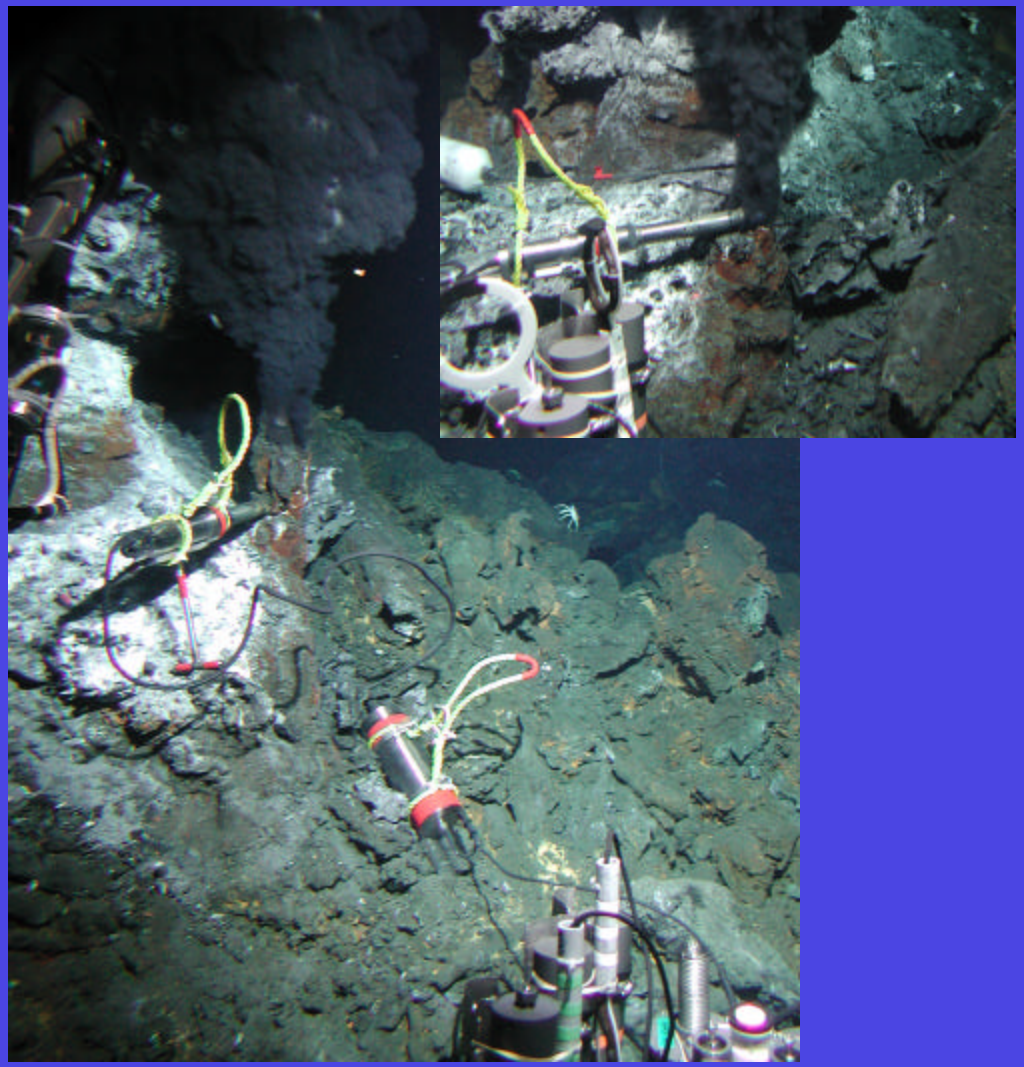


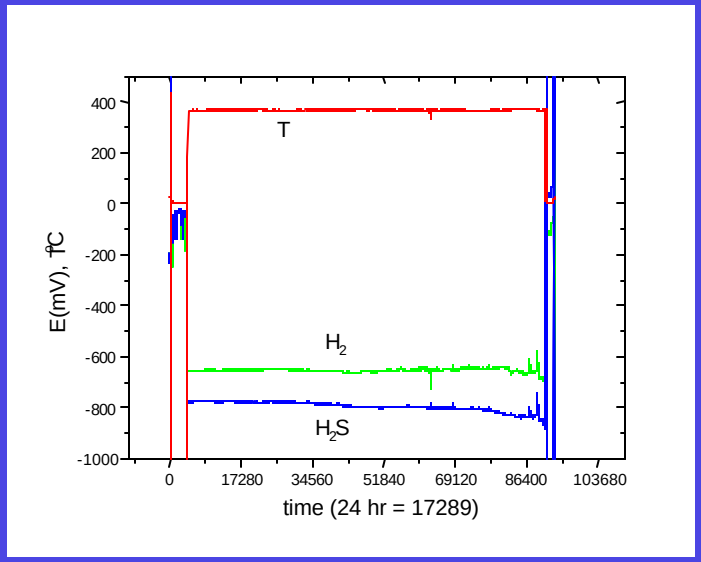


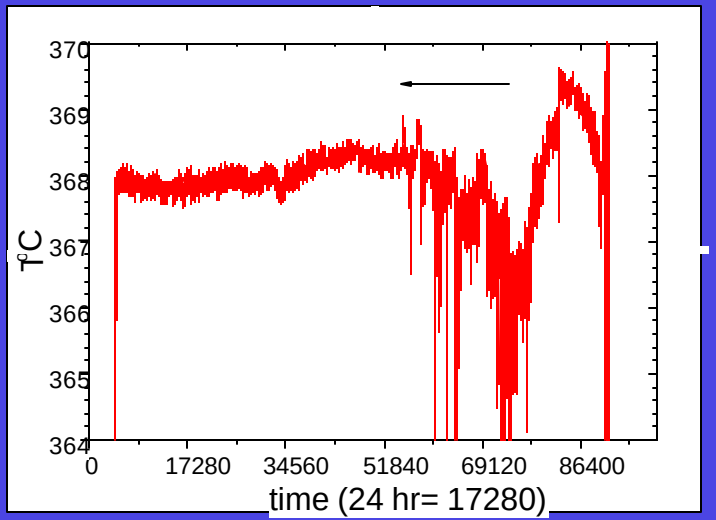




Continuous In-situ monitoring at P vent







After deployment

The sensors are adapted to the vent flow system.

Von Damm

15 Mar – 01 Apr

Karen Von Damm Presenter

(will use overheads)

Lutz, Tolstoy, Shank

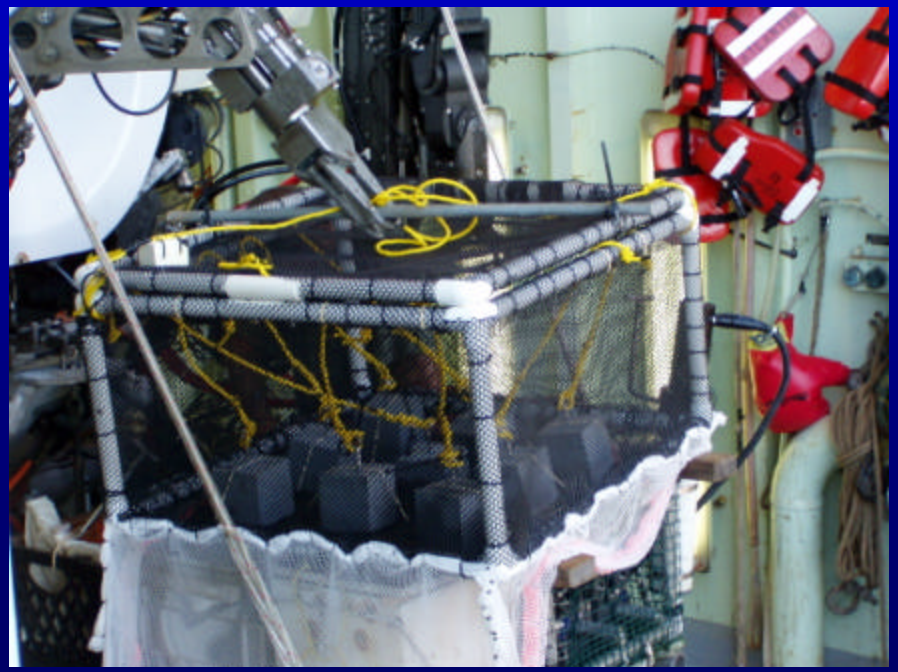
6 Apr - 30 Apr

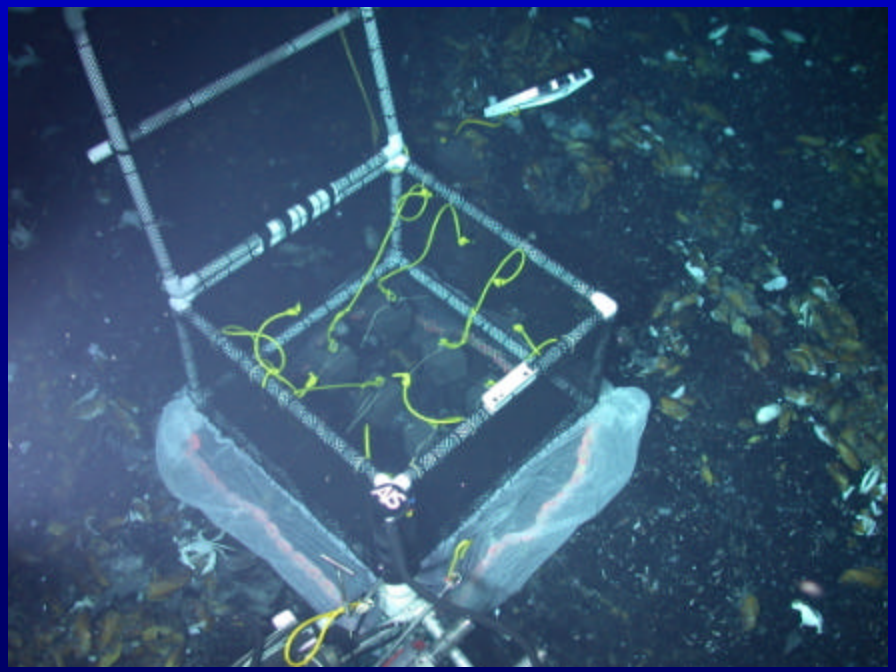
PIRATES II Expedition
9°50'N April 2004

Dr. Richard Lutz & **Dr. Costantino Vetriani** *(Rutgers U.)* • **Dr. George Luther** *(U. Delaware)*
Dr. Timothy Shank *(WHOI)* • **Dr. Maya Tolstoy** *(Columbia U.)* • **Liz Goehring (RIDGE)**

- multi-disciplinary collaborative effort integrating time-series experiments at diffuse flow vents to examine the biotic and abiotic factors driving species succession in vent communities

- Deployed 3 exclusion cage experiments to examine invertebrate re-colonization and succession in vent habitats; correlation with fluid chemistry, microbial community structure, and seismic activity
- Mussel denuding effectively "resets" species succession to an earlier state such that communities emerging from denuded (and excluded) areas should resemble earlier succession stages.





PIRATES II Expedition
9°50'N April 2004

Field Activities

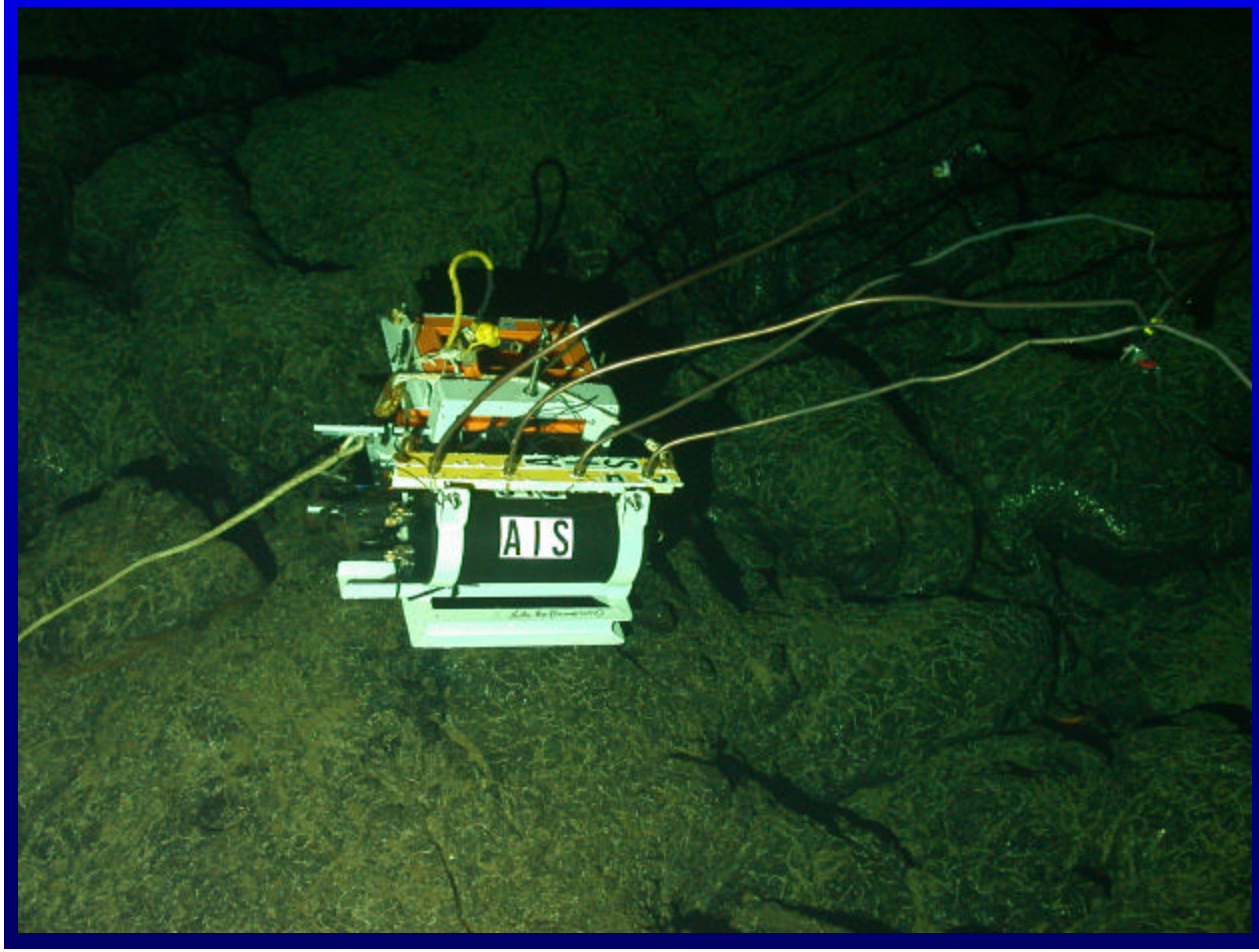
- Co-located fluid and microbial sampling with *in situ* chemical data before and after mussel denuding/collection
- Invertebrates used for species-specific genetic probe development for identification of recruits
- Deployed arrays of settlement blocks and temperature loggers in each of three 1m x 1m cages
- Recovered and examined short-term blocks for microbial biofilms and invertebrate recruits
- Conducted downlooking photographic and high-resolution bathymetric surveys to generate full-length 3-dimensional "mosaic maps" of the Transect Area at 9°50'N (see V. Ferrini RIDGE2000 poster)
- Recovered 9 and deployed 12 OBS arrays focused on experimental (and broader) areas
- Conducted 5 SEAS (**S**tudent **E**xperiments **A**t **S**ea) experiments

2004 Program "concept tested"

- *Program components and web portal developed*
- *12 teachers participated, ~800 ms & hs students*
- *14 proposals, 5 experiments conducted during our cruise*
- *April 2005: additional component: "Classroom to Sea" Laboratory*

PIRATES II Expedition
9°50'N April 2004

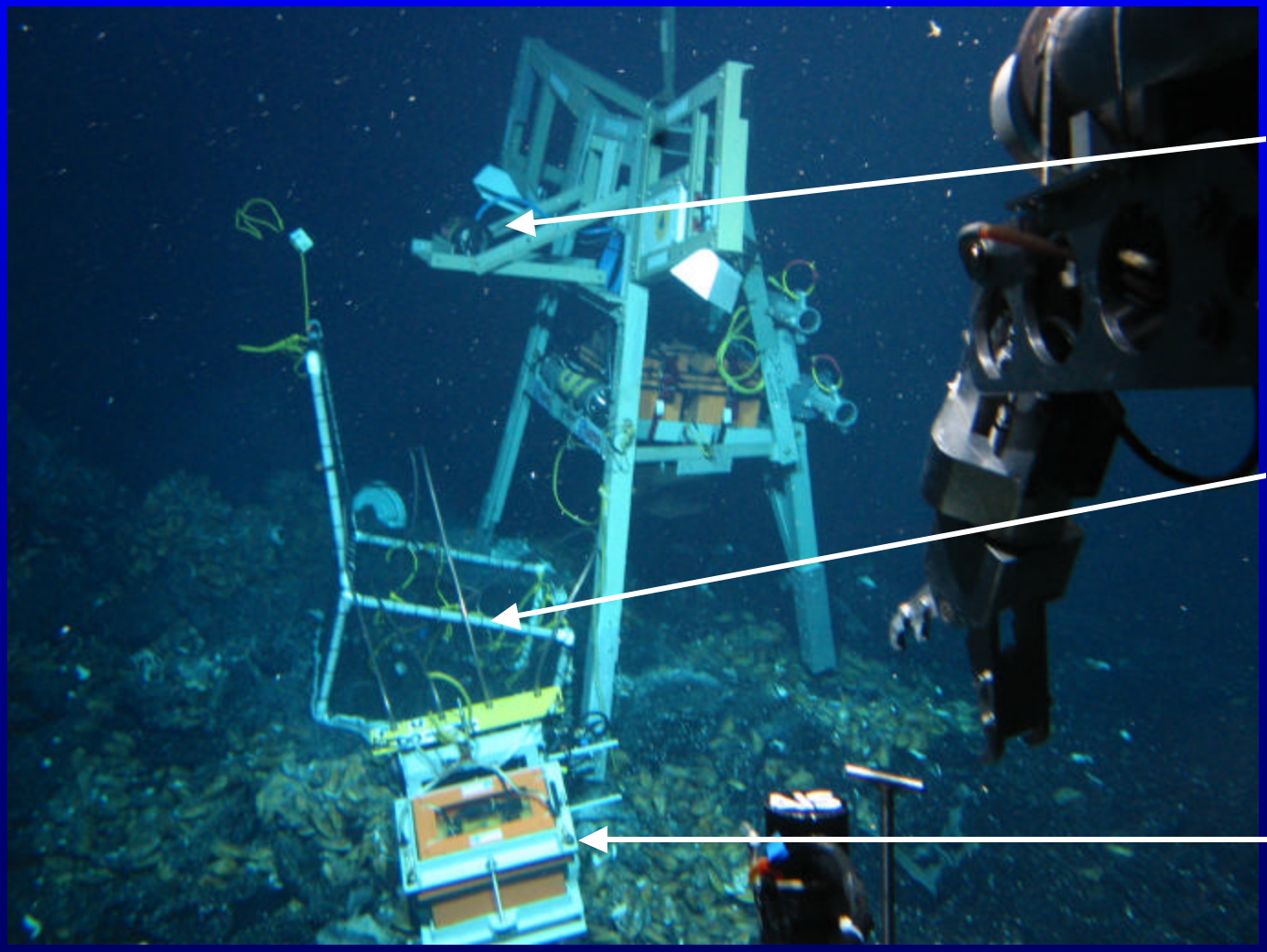
• The affect of differing microbial communities, fluid chemistry, seismic activity on invertebrate recruitment were examined using an autonomous ***I****n* ***S****itu* **E**lectrochemical **A**nalyzer- measures dissolved chemical species: e.g., O_2, H_2S, Fe(II), Mn(II), Fe(IIII) compounds, molecular clusters such as FeS



The ISEA (built by AIS, Inc.) has 4 working electrodes are used in series. The ability to use 4 working electrodes allows the user to place the four electrodes at the same location for reproducibility testing or four different locations to maximize data collection. The working electrodes are on 5 meter wires.

PIRATES II Expedition
9°50'N April 2004

ISEA electrodes in the Biomarker 119 mussel cage, with underwater time-lapse camera



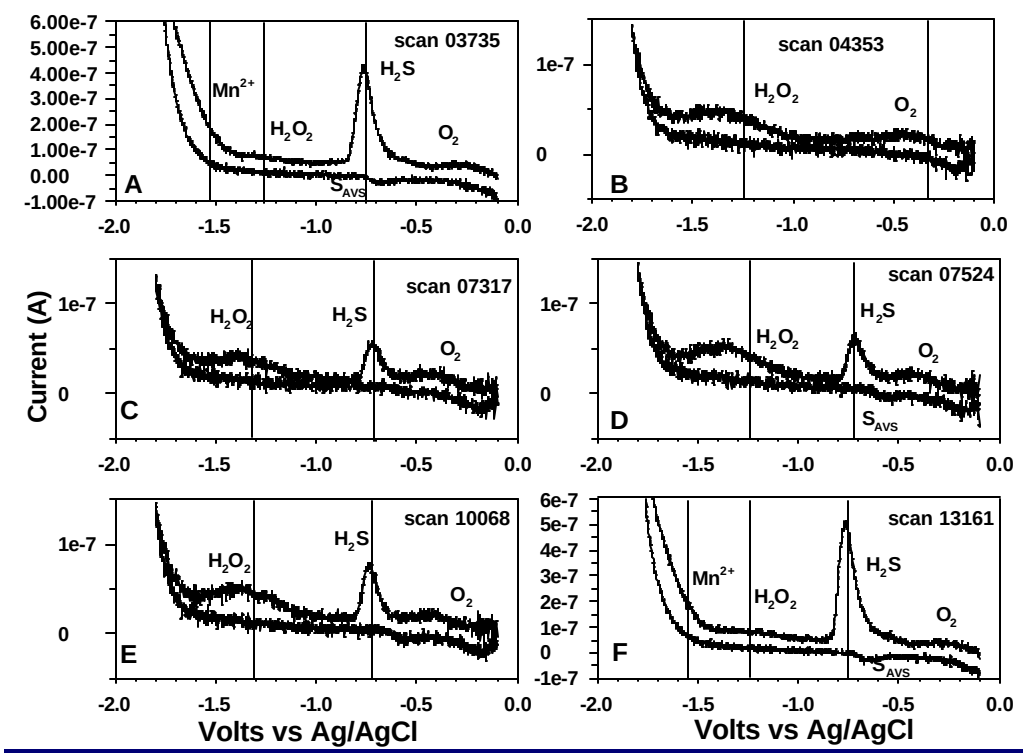
PIRATES II Expedition
9°50'N April 2004

QuickTime™ and a
YUV420 codec decompressor
are needed to see this picture.

DigiSeaCam image every 6 minutes for 5 days
Electrochemical scans in series every 3 minutes, next to 4 blocks

PIRATES II Cruise
9°50'N April 2004

Representative rawdata scans over time



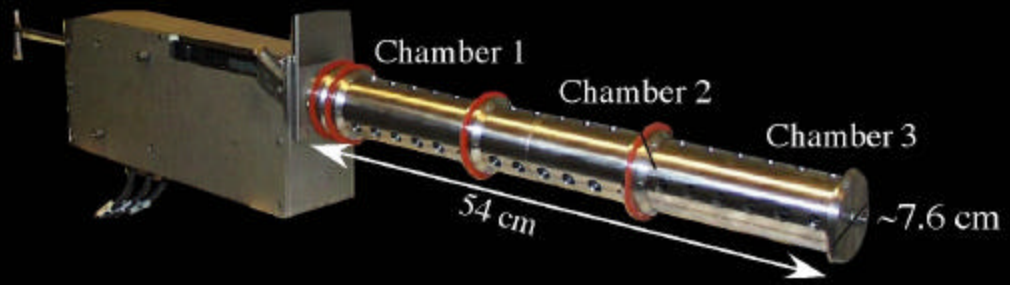
The electrodes have been used and tested to 250 atm pressure and 120 ^{0}C. During cruises at 9°50' N East Pacific Rise in Dec. 2003 and April 2004, the ISEA was deployed four times; once in survey mode on the DSV *Alvin* and three other times as in slides A-E on the bottom for a period of 3-5 days. The scans A-E are raw data from one electrode at one *Riftia* organism without any smoothing or other manipulation (Note difference in current scales – current is proportional to concentration). The 4 electrodes were run continuously including electrochemical conditioning between each scan to maintain electrode integrity. Dissolved O_2, free sulfide (H_2S/HS^-) and Mn^{2+} data were obtained at 4 separate *Riftia* tubeworms during the deployments. Although temperature only varied between 2 – 9 ^{0}C, these 3 chemical species varied by over an order of magnitude and sometimes were not detectable (Fig B shows H_2S).

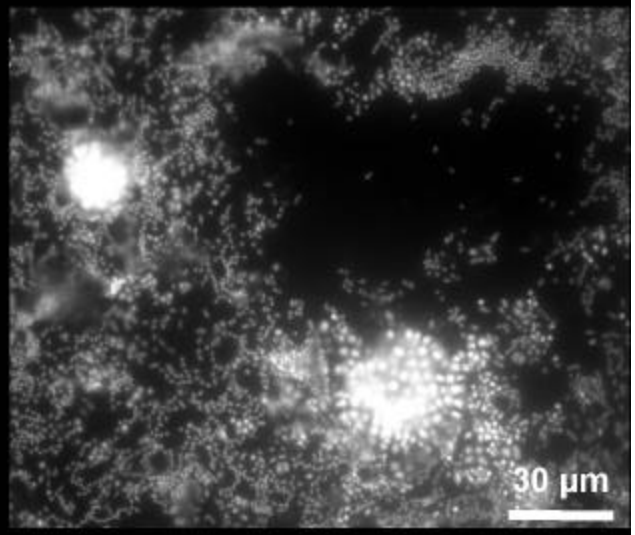
Kelley, Brown, Hilton

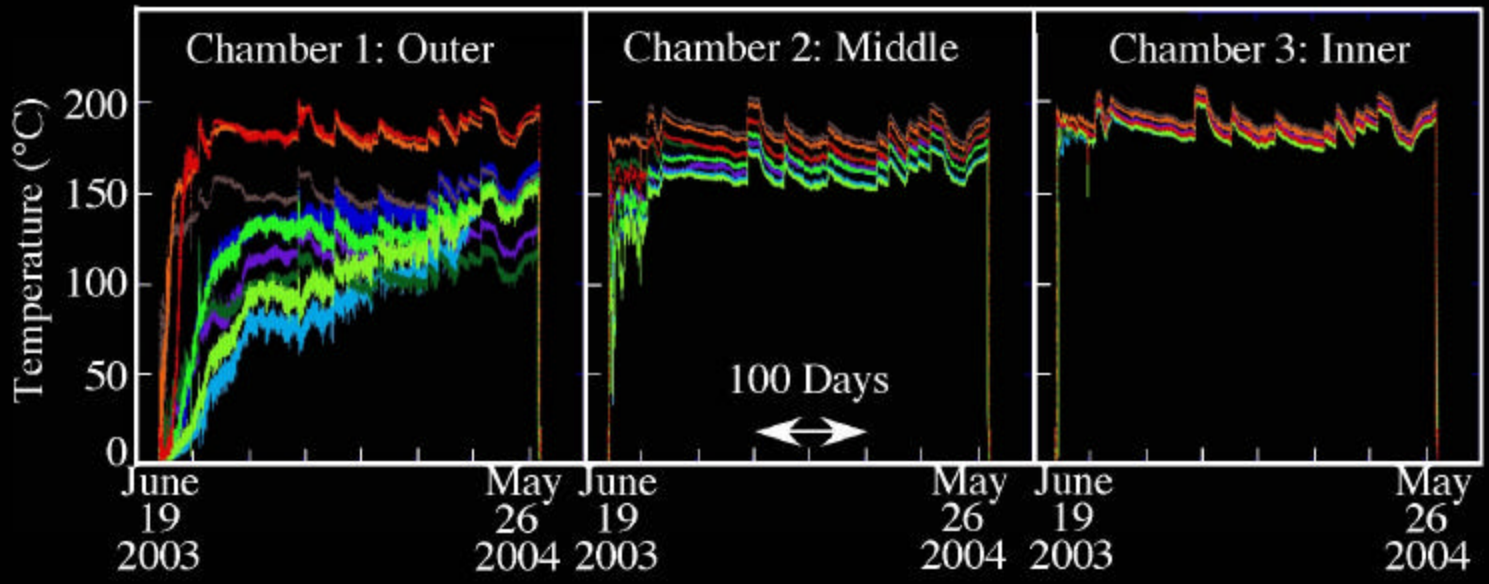
23 May – 7 Jun

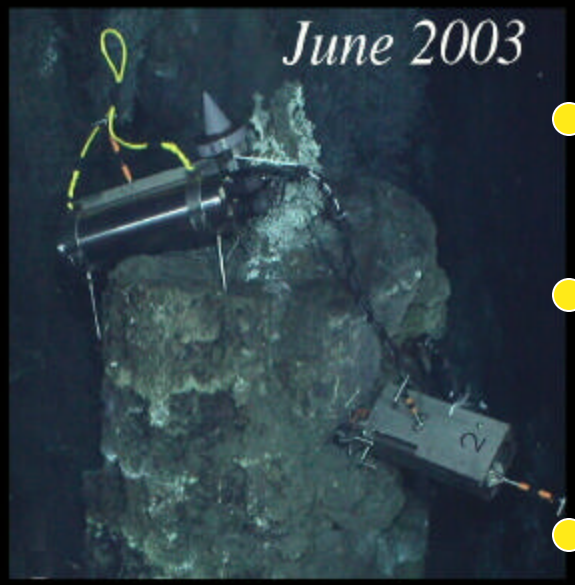
Debbie Kelly presenter

Kelley: Sulfide-Microbial Observatory Cruise
Atlantis-Alvin 6 Dives
May 23-June 7







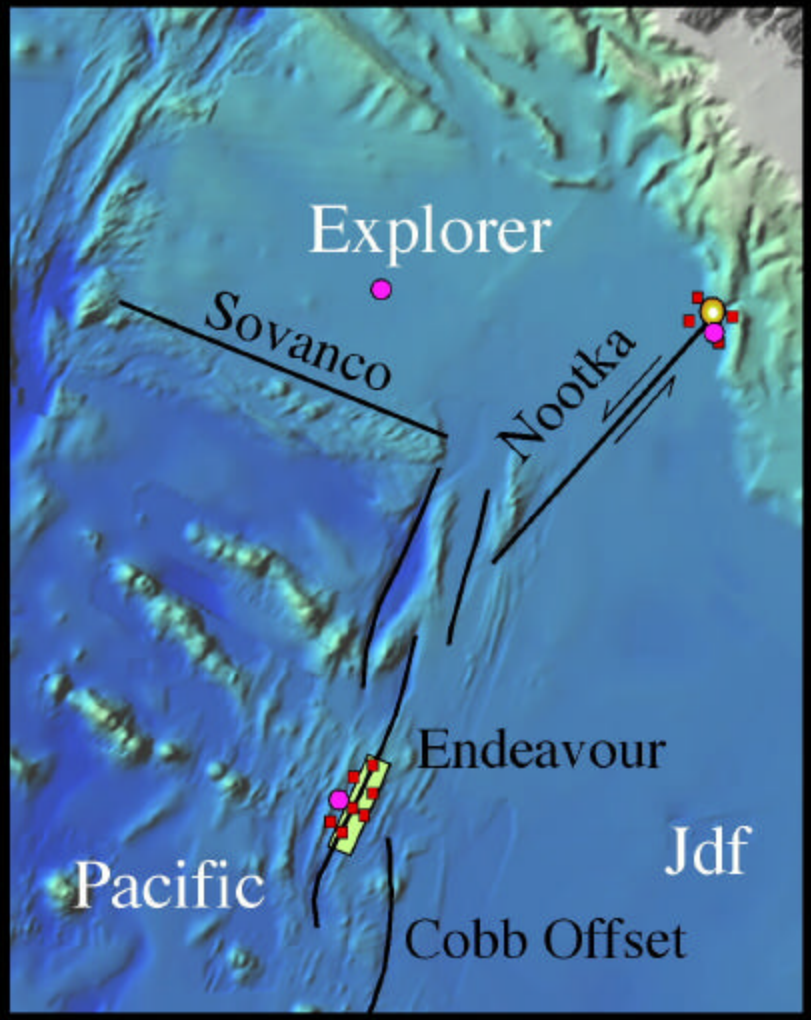


6 Dives:

- Recovered two incubators from Mothra after 1-year deployment
- Both worked for entire duration with >600,000 temperatures measured on each instrument
- Mapped significant portion of Mothra at ~ 5 m resolution with imagenix
- Follow-on geology dive established Mothra as the largest field on Endeavour > 600 m
- Reinstalled new incubator for follow-on experiment in same hole (Roane)
- Supported Dive and Discovery outreach effort

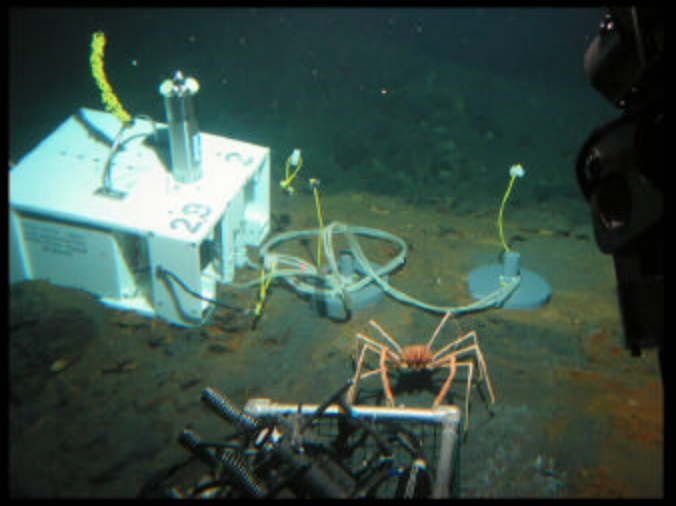
2 Dives:

- Cleaned up Main Endeavour Field
  Dedicated transponder recovery dive



Brown-Hilton

5 dives to test chemical flow sensors



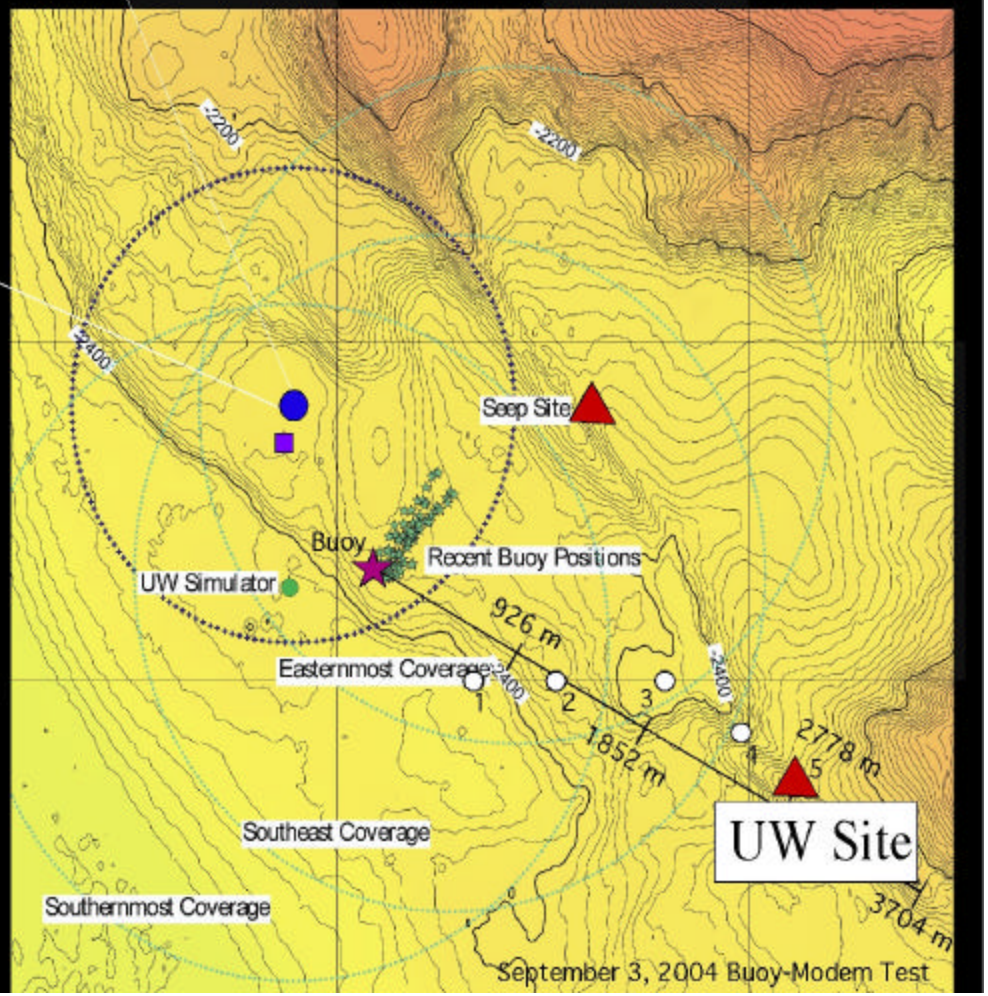
- 2 dives Endeavour
- 2.5 dives Nootka
  Delaney-Tryon: significant seep discovery Nootka
- Night dive

- Buoy-Acoustic Modem Observatory (WHOI-UW)

Keck Seismic array
UW-MBARI-UO

- Short periods (10)
- Broadbands (3)

Chemical Flow sensor deployed on follow-on Keck program

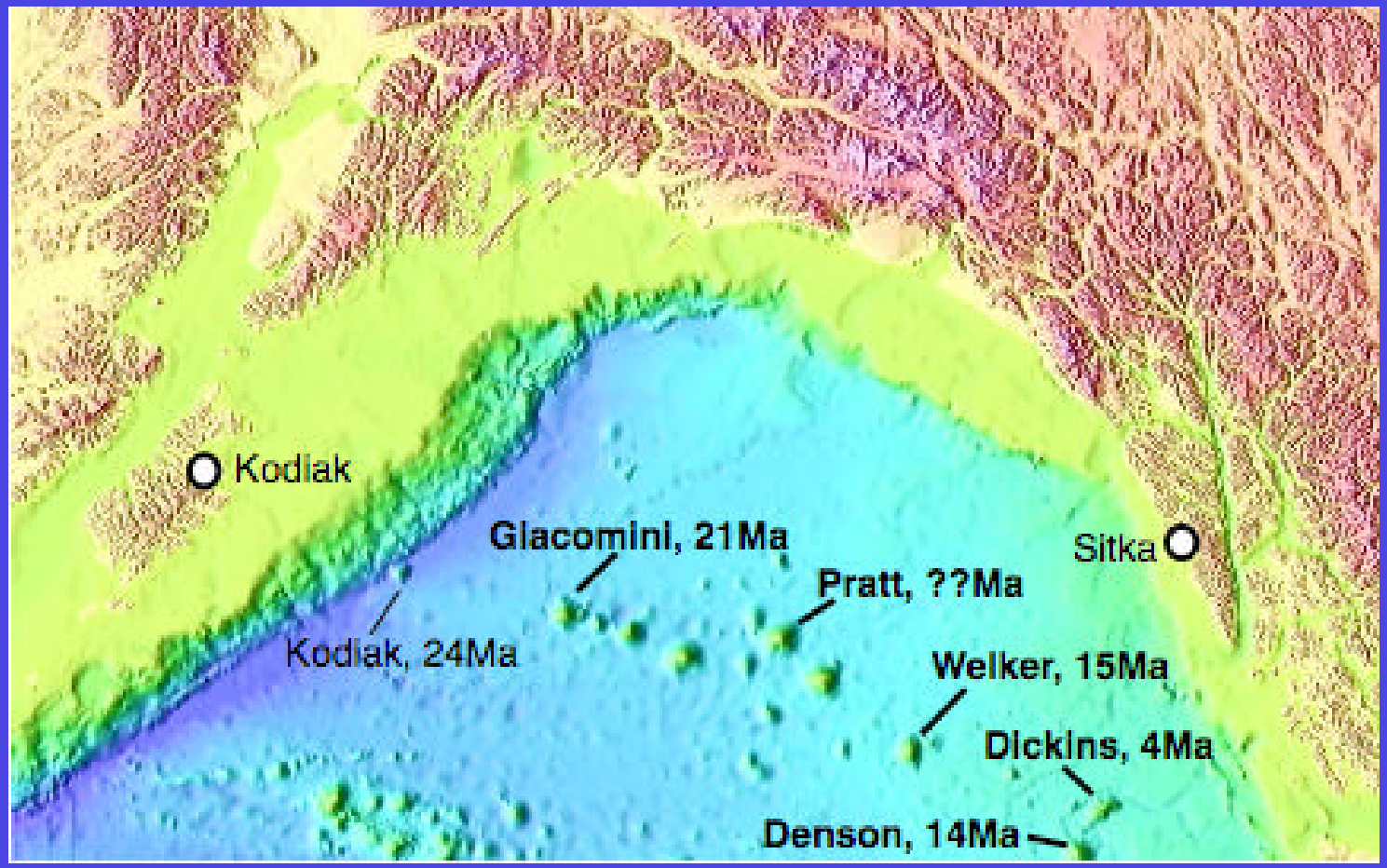


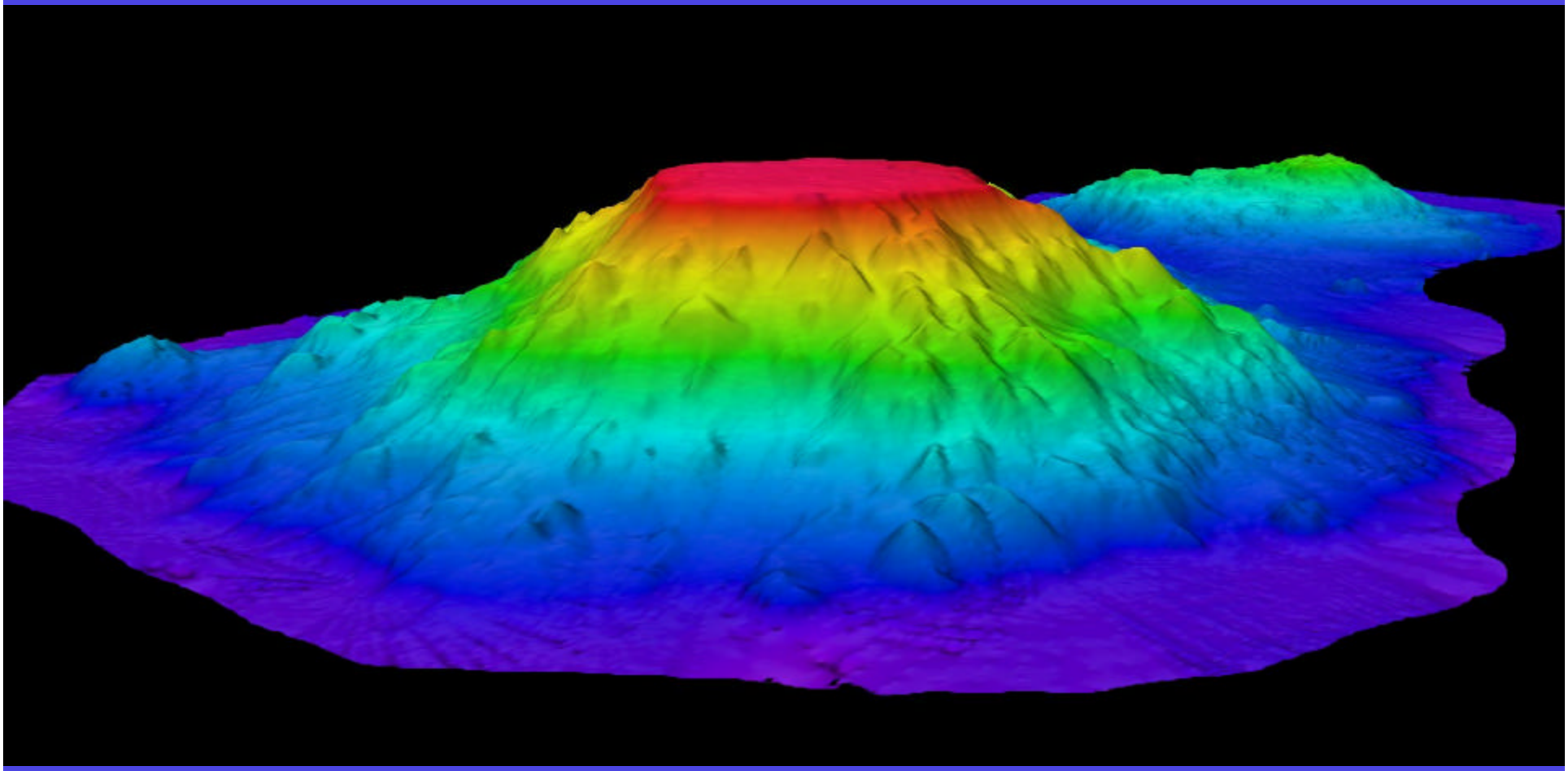
Ocean Exploration

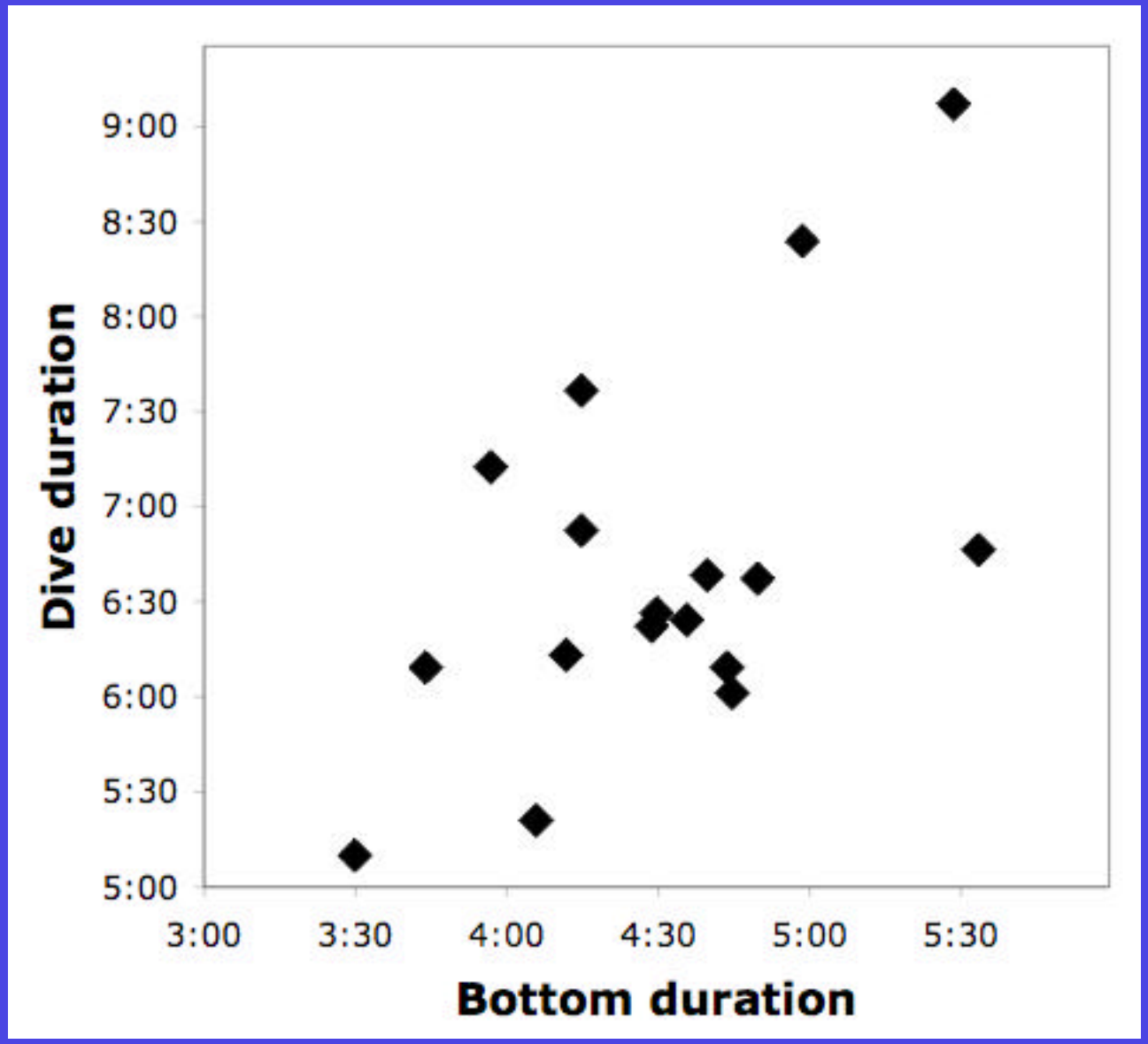
(Shirley, Baco-Taylor,Etnoyer, Keller)

30 Jul – 23 Aug

Randy Keller presenter


Kodiak
Glacomini, 21Ma
Sitka
Pratt, ??Ma
Kodiak, 24Ma
Welker, 15Ma
Dickins, 4Ma
Denson, 14Ma




Dive duration
9:00
8:30
8:00
7:30
7:00
6:30
6:00
5:30
5:00
3:00
3:30
4:00
4:30
5:00
5:30
Bottom duration

Janet Voight

28 Aug – 4 Sep

Debbie Kelley Presenter (unless Jim McClain is present)

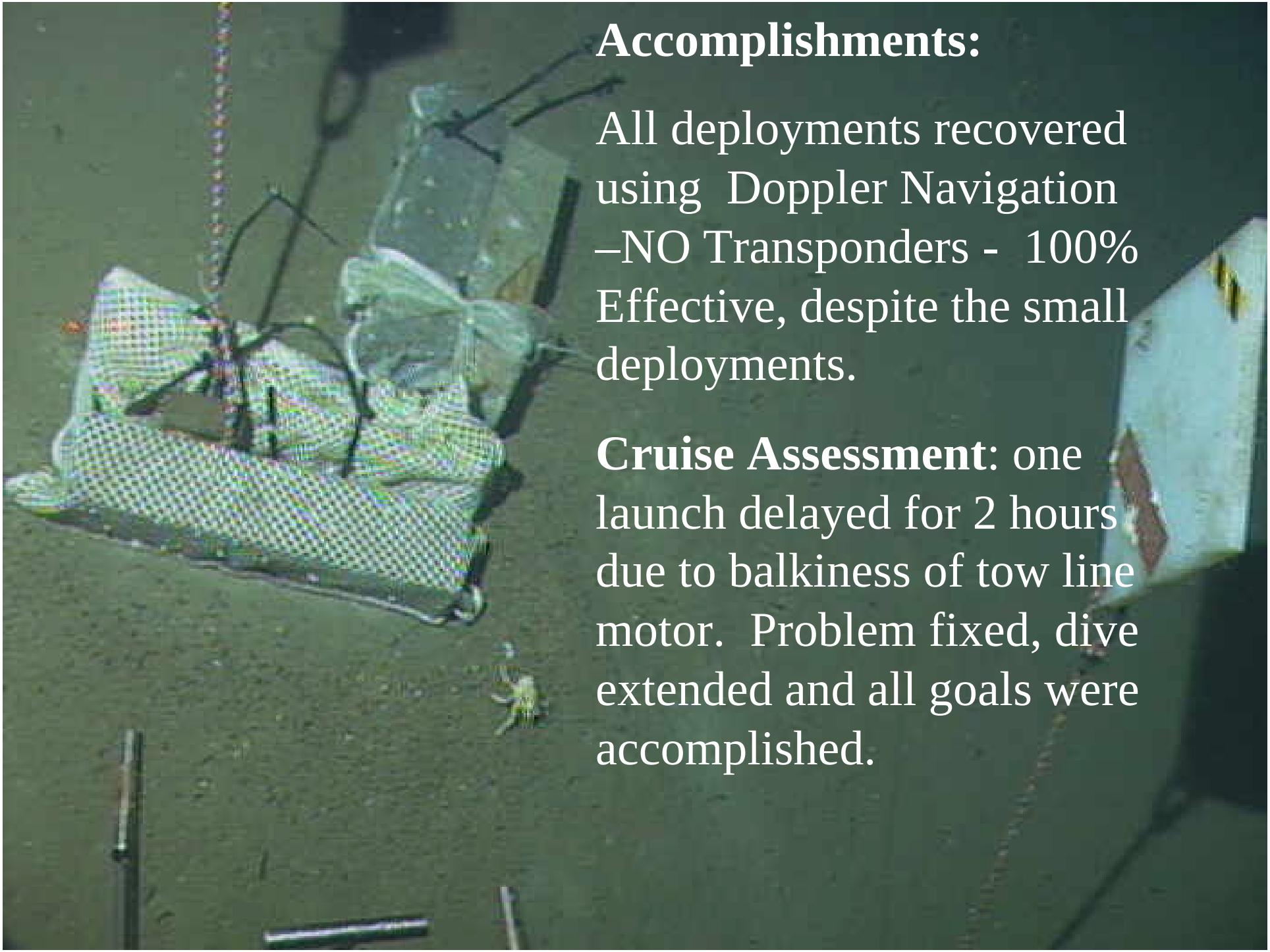
R/V ATLANTIS 11-16
and Alvin

28 Aug – 4 Sept. 2004

P.I. Janet Voight
The Field Museum

Invertebrates at Seafloor Deployments of Wood

GOALS: Recover small (50 by 20 cm with a 1 m high marker) deployments made in 2002 by the ROV's Jason and Tiburon at Endeavour, 2 Gorda Ridge sites, and a non-vent site.



Accomplishments:

All deployments recovered using Doppler Navigation –NO Transponders - 100% Effective, despite the small deployments.

Cruise Assessment: one launch delayed for 2 hours due to balkiness of tow line motor. Problem fixed, dive extended and all goals were accomplished.

Booksh, Edwards

5 Nov – 26 Nov

No slides submitted

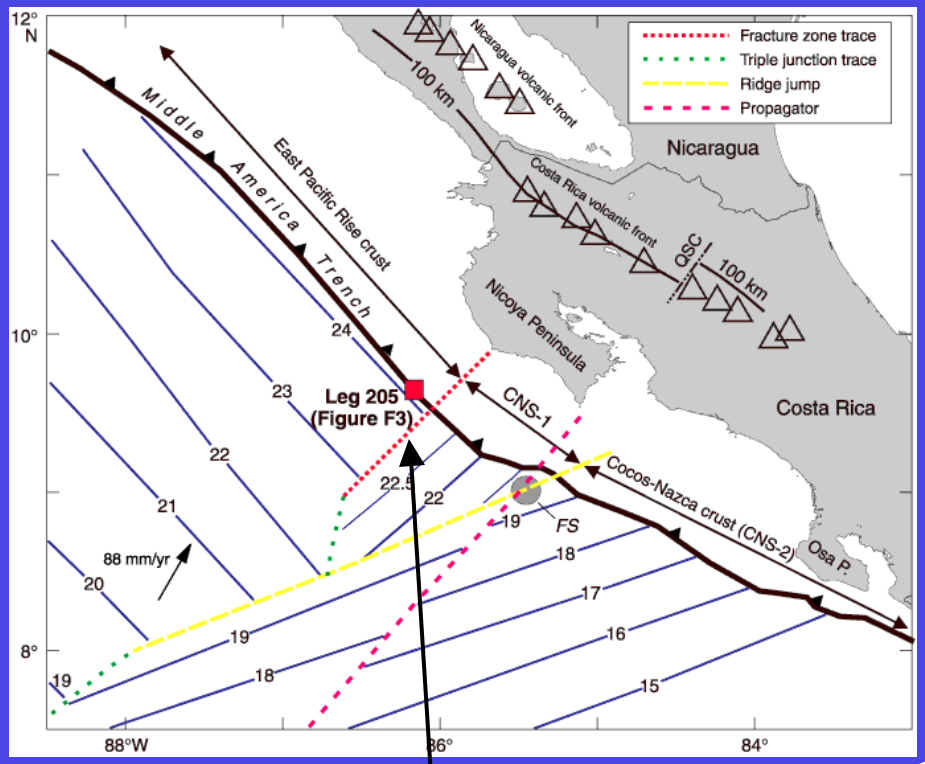
Booksh, Edwards

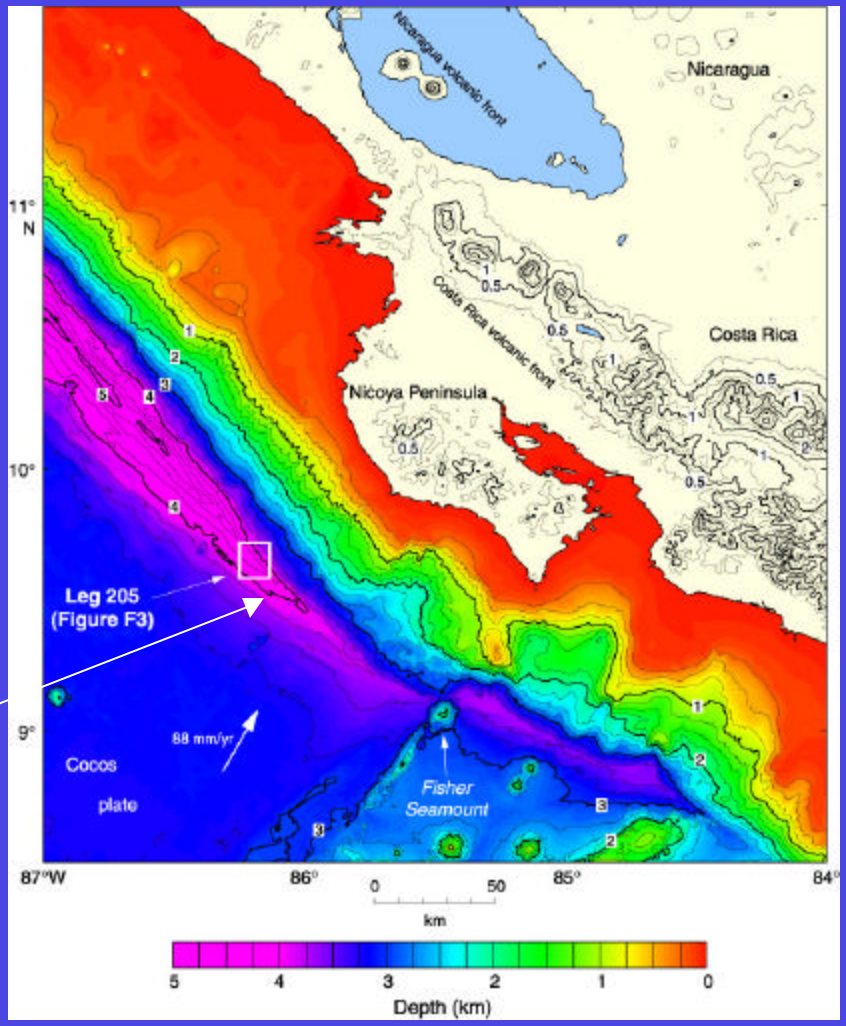
5 Nov – 26 Nov

No slides submitted

Miriam Kastner
27 Feb – 7 Mar

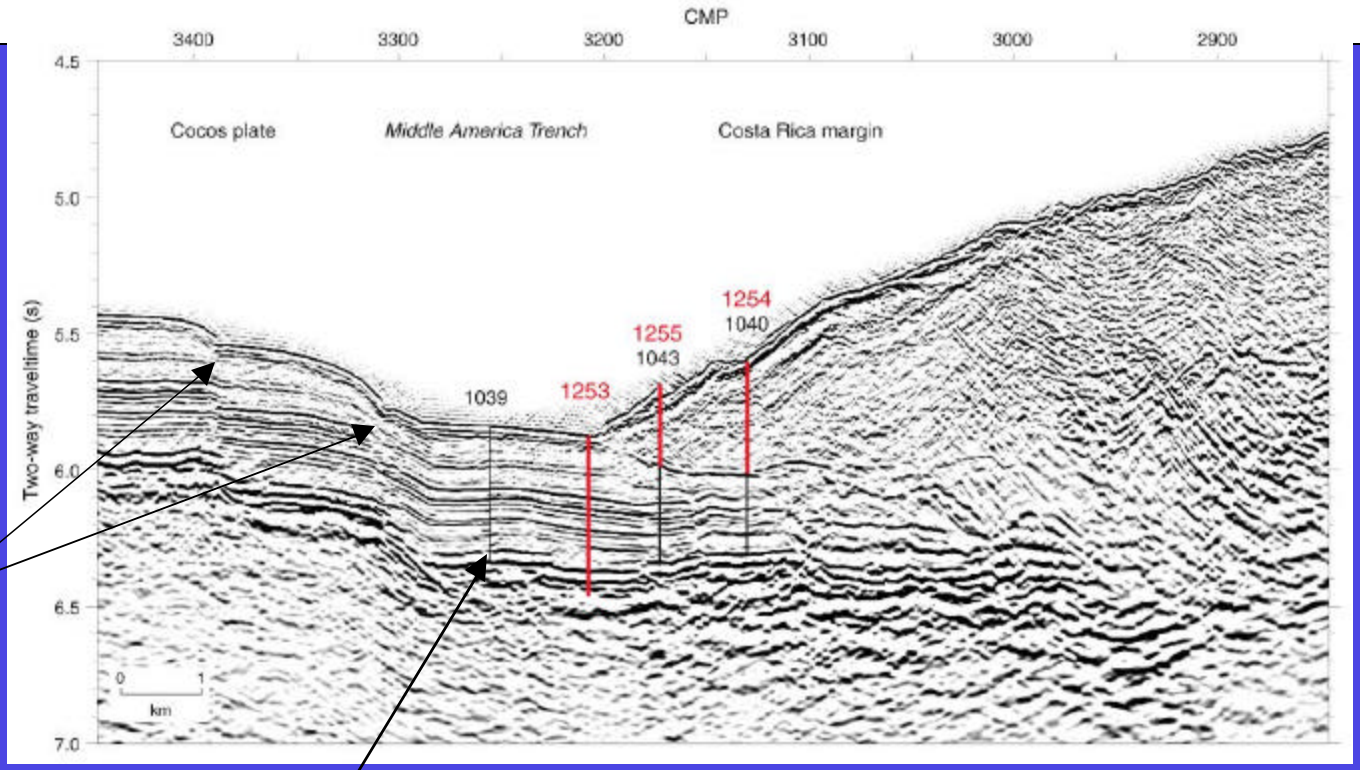
Miriam Kastner Presenter





Convergence rate:
Currently ~ 88mm/yr

RSB, Crust at 205 Sites from EPR (~24 Ma)
Formed at full spreading rate of 130 mm/yr



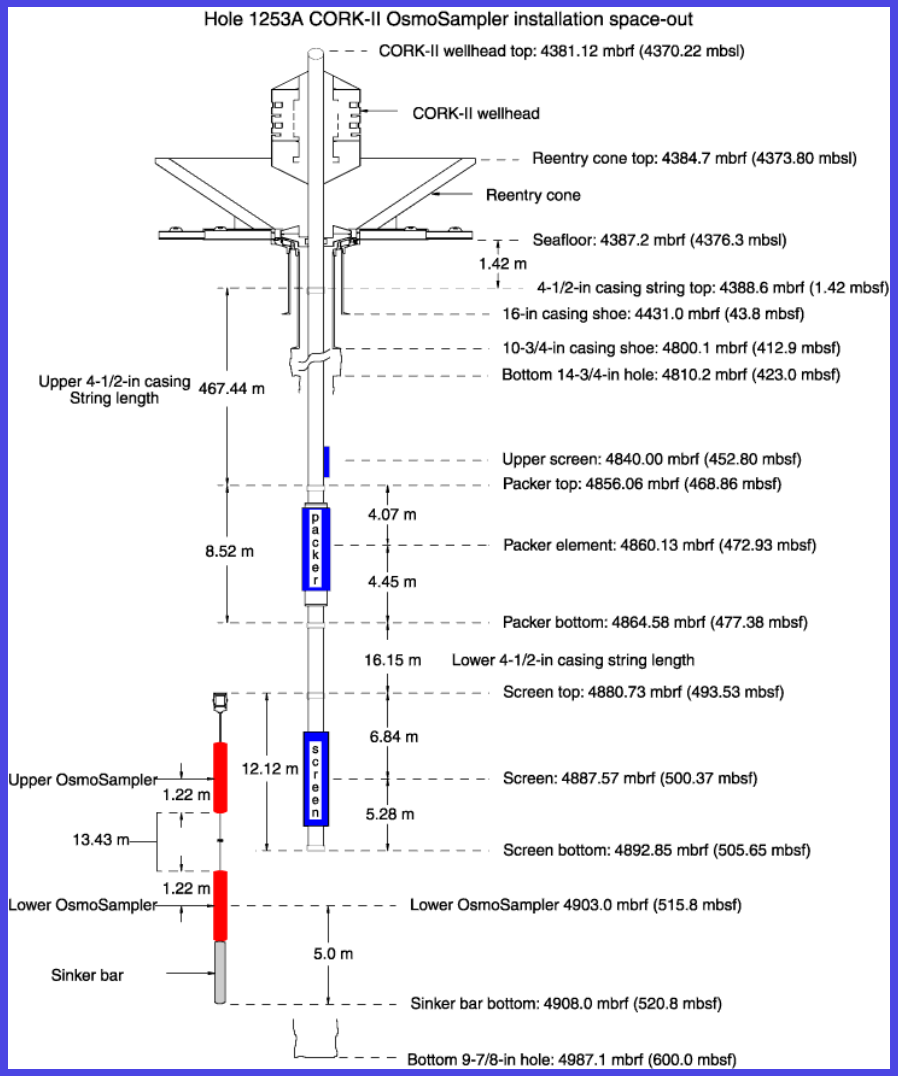
Normal faults
Offsets of
50-100 m

Gabbro sill – may have been related to 14-12Ma hot-spot overprinting. The FZT could have acted as a "leaky fault"

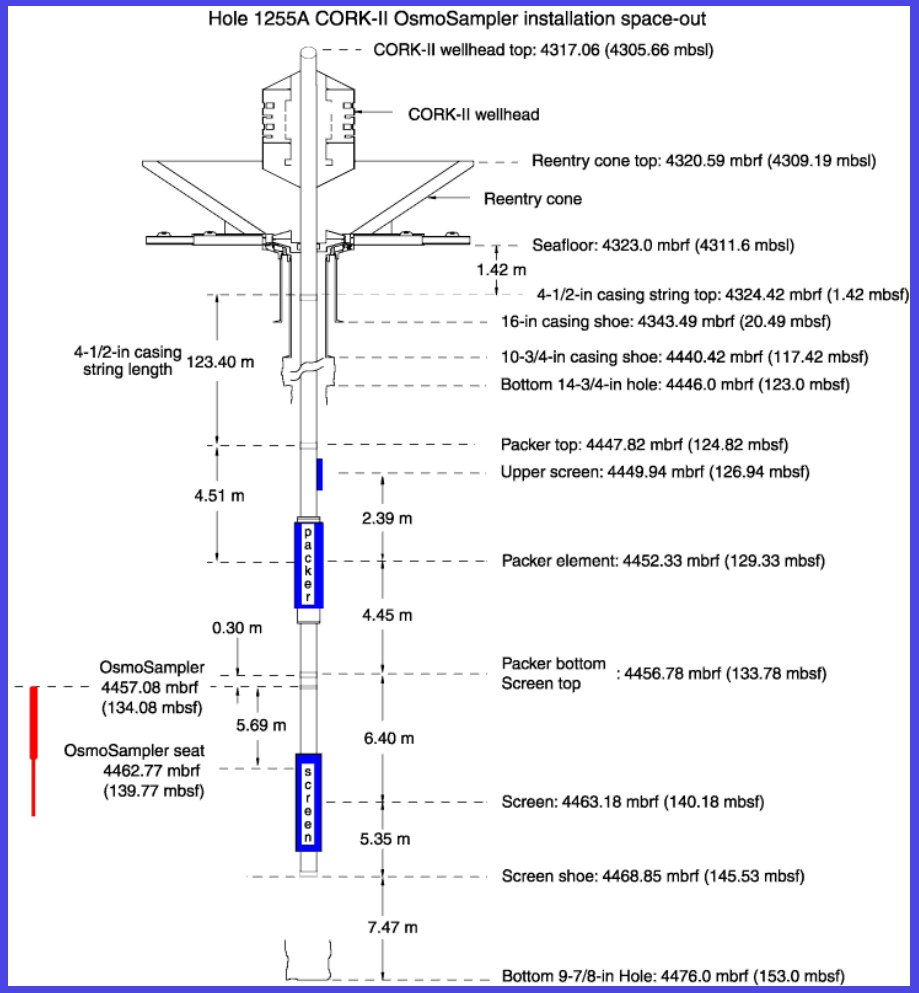
Thickness of incoming sediments = ~ 400 m

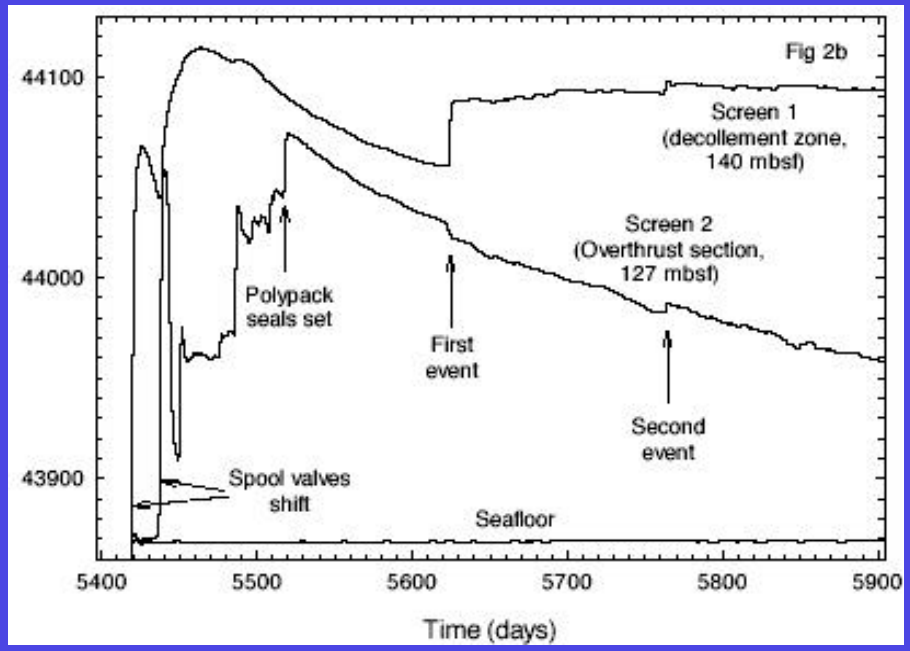
Convergence direction of Cocos offshore Nicoya is almost perpendicular to the trench. Dip angle of slab in upper 100 km = ~ 30^{o} Dip = 80^{o} at 100km depth

Site 1253

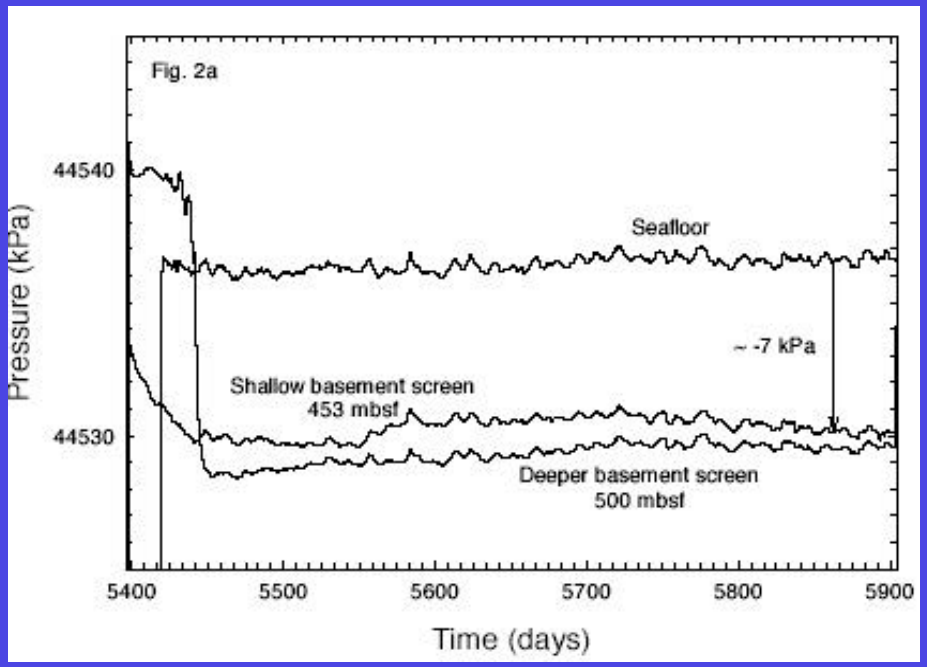


Site 1255





Site 1255



Site 1253

Costa Rica Margin
seafloor temperature