JASON
November 14-December 17
Maurice Tivey

JASON
April 5 - May 11
Meg Tivey

TUIM05MV – RV Melville/DSV Jason2

LAU Basin Vent Characterization Cruise

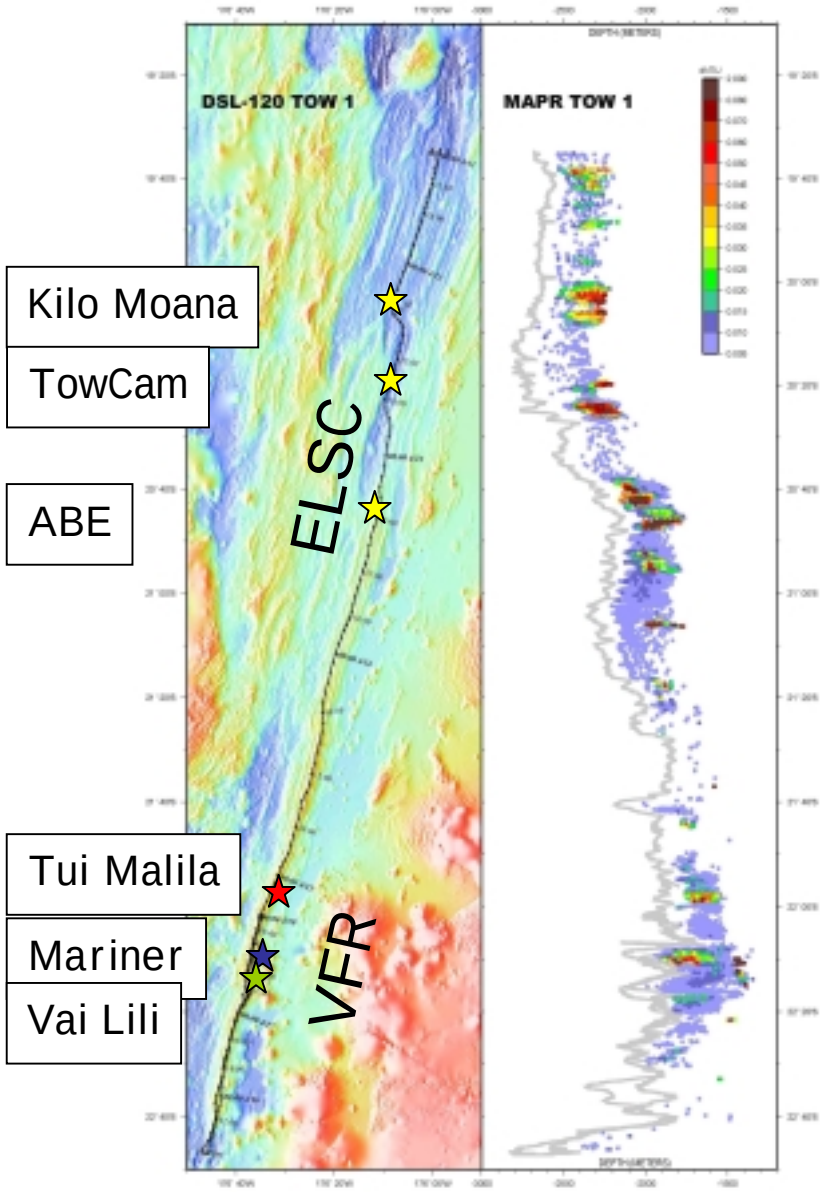
Research funded by NSF

April 5-May 7, 2005

Tonga - Tonga

- **P.I.s M.K. Tivey, J. Seewald (Woods Hole Oceanographic Institution), C.G. Wheat (University of Alaska), M. Mottl (University of Hawaii), A-L. Reysenbach (Portland State University), S. Kim (Moss Landing Marine Lab)**
- **Science Party: C. Agee, A. Banta, A. Bowen, J. Calderwood, A. Collasius, C. Colt, P. Craddock, T. Crook, R. Elder, V. Ferrini, P. Forte, S. Gegg, K. Hammerstrom, R. Harper, S. Kelly, T. McCollom, A. Moala, B. Nichols, J. Oakden, C. Offinger, G. Proskurowski, E. Reeves, J. Sharkey, M. Stephens, A. Sterling, S. Vailea, M. Voytek, R. Waters, R. Zook**

Vent Fields studied along the ELSC and VFR



E. Baker & J. Resing, pers. comm., 2004
From F. Martinez et al. Cruise, 2004

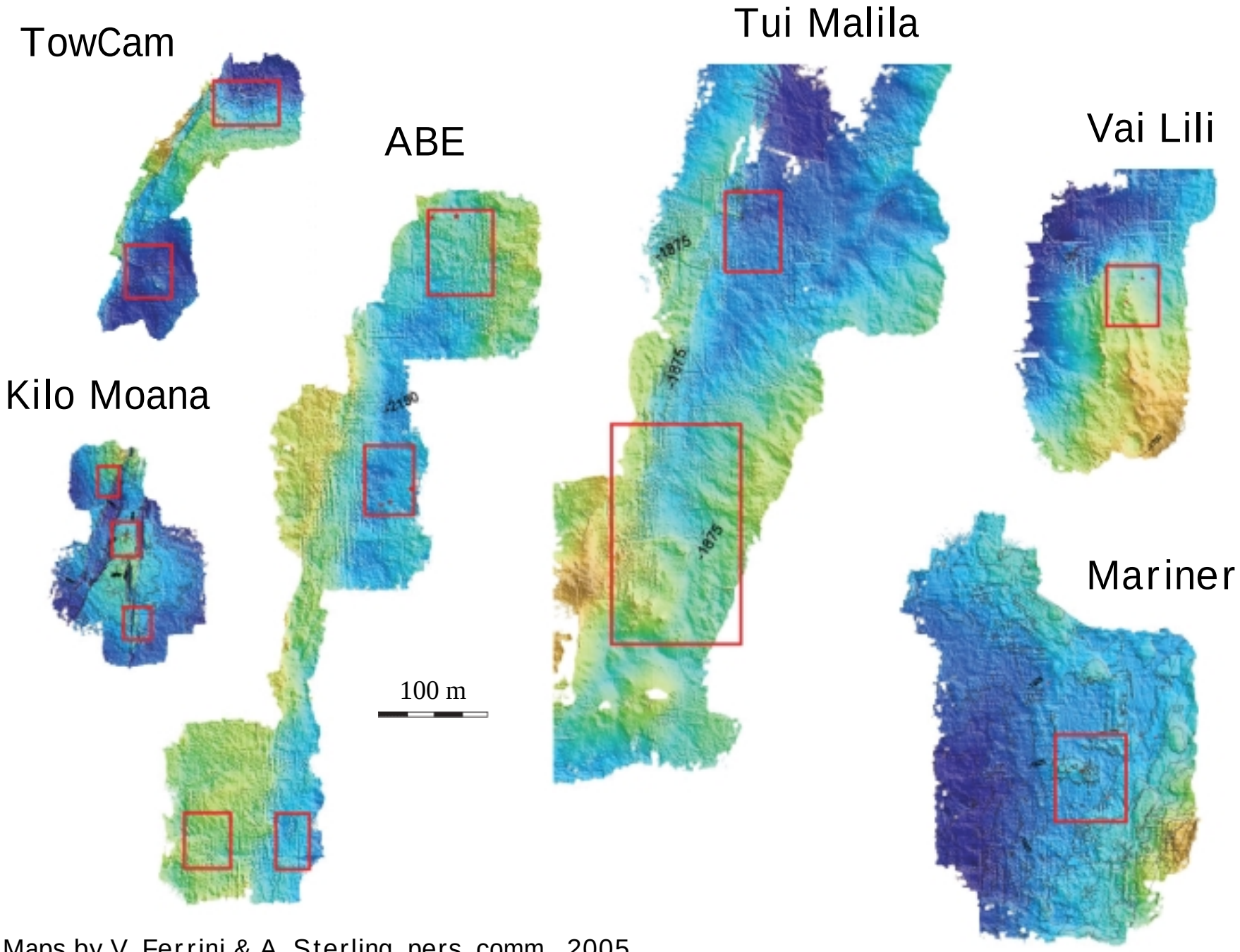
How discovered:

- ★ *Nautile* Dives from water column temperature anomaly data and dredged hydrothermal deposits. (Fouquet *et al.*, 1991)
- ★ Water column (MAPR, CTD), ABE and TowCam surveys. (Martinez *et al.* and Langmuir *et al.* cruises, 2004)
- ★ Water column surveys, ABE, TowCam, *Shinkai* 6500 Dives. (Martinez *et al.*, Langmuir *et al.* and Takai *et al.* cruises, 2004)
- ★ Multiple CTD Tow-Yo Casts using MAPR data. (Tivey *et al.* cruise, 2005)

TUIM05MV – RV Melville/DSV Jason2

Successfully characterized for each of 6 vent fields:

- Distributions of types of venting, types of vent structures and morphologies, and their relations to substrate and the range and distribution of megafauna (SM2000 and down-looking pixelfly)
- Fluid chemistry (Seewald gastight and major bottles)
- Vent deposit mineralogy/bulk geochemistry (grab samples/bioboxes)
- Molecular and physiological diversity of microbes associated with diffuse and high T fluids and active chimneys (subsamples of fluids/solids)
- Range, abundance, distribution, and reproductive status of dominant megafaunal organisms in vent fields and distribution of larvae/plankton in water column above vents (slurp/grab/bioboxes and MOCNESS)



Maps by V. Ferrini & A. Sterling, pers. comm., 2005

Numbers of samples collected from vent fields on TUIM05MV.

	Kilo Moana	Tow Cam	ABE	Tui Malila	Mariner	Vai Lili	Total
High T fluid	15 (7 vents)	12 (6 vents)	12 (5 vents)	11 (7 vents)	11 (5 vents)	6 (2 vents)	67
Low T fluid	1 (1 vent)	2 (1 vent)	4 (3 vents)	2 (1 vent)	3 (1 vent)	2 (1 vent)	15
Active vent deposit	10 (5 w/fluid)	9 (4 w/fluid)	8 (3 w/fluid)	10 (5 w/fluid)	6 (3 w/fluid)	2 (1 w/fluid)	45
Inactive vent deposit	4	4	5	9	3	3	28
Igneous substrate	5	3	6	11	2	4	31
Megafauna	11	14	10	7	3	0	45

Cruise Assessment:

Melville, Jason2, systems, operations, process all very good.

SM2000 worked well BECAUSE WE BROUGHT AN EXTRA PERSON TO DEAL WITH SM2000 which allowed near real-time processing

But there were still some lessons learned.
SO, if we had it to do over again we would:

1) Lay our own transponders (takes less time than trying to figure out why ones left by earlier cruises are either not responding, or responding with a weak signal)

2) Ask for more contingency days if ship time is in cyclone season, even the tail end! We lost NINE days to weather – nine days when we could not put Jason2 in, or had to recover early. (Had 21 days of successful dives)

ON 10-YEAR TIME FRAME THERE SHOULD BE SOME PLAN FOR JASON2 TO BE ABLE TO LAUNCH IN HIGHER SEA STATES!

TUIM05MV POSTERS – WEDNESDAY AM, T31A, MCC Level 1

Characterization of Six Vent Fields Within the Lau Basin
M K Tivey, *P Craddock, J Seewald, V Ferrini, S Kim, M Mottl, N A Sterling, A Reysenbach, C G Wheat, and TUIM05MV Scientific Party

High-Resolution Micro-Bathymetry Mapping in the Lau Basin: Examples From the Tui Malila and Mariner Vent Sites
* V Ferrini, A Sterling, F Martinez, M K Tivey, M Mottl, S Kim

Aqueous Volatiles in Lau Basin Hydrothermal Fluids
*J Seewald, T McCollom, G Proskurowski, E Reeves, M Mottl, J Sharkey, C G Wheat, M Tivey

Vent Fluid Chemistry From Six Hydrothermal Fields Along the Eastern Lau Spreading Center From 20deg03'S to 22deg13'S.
*J Sharkey, C G Wheat, M J Mottl, J Seewald

Bacterial and Archaeal Diversity From the Eastern Lau Spreading Center
*A Reysenbach, A Banta, S Kelly, J Kirshstein, M Voytek

Overview of the Ridge 2000 Integrated Studies Sites
*C Fisher, a Ridge 2000 Steering Committee

JASON

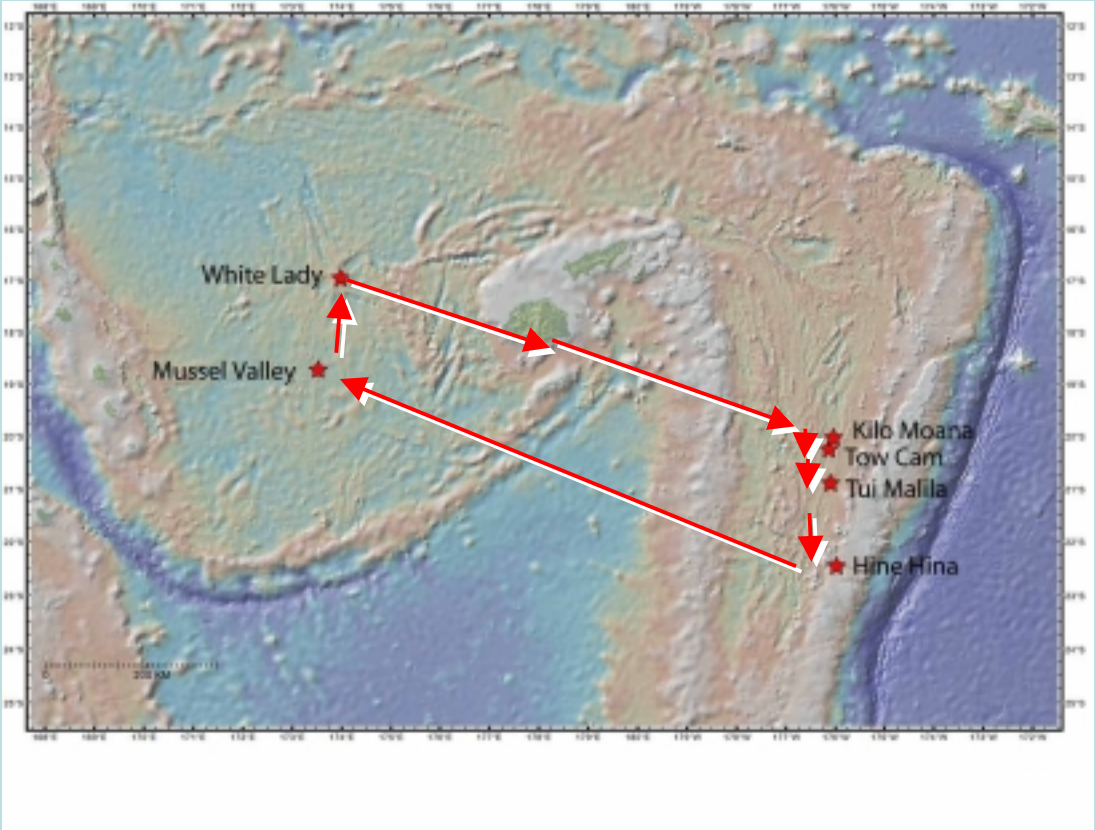
May 15 - June 3

Robert Vrijenhoek

Cindy Vandover

JASON
June 9- June 29
Childress

Fiji-Lau *Jason II* expedition: 15 May-3 June 2005



Investigators:

- R Vrijenhoek: 12 NSF-funded dives
- CL Van Dover: 2 NSF-funded dives

Goals:

- Sample biology at Lau sites identified by RIDGE program
- Sample biology at N. Fiji sites

Collaborators

Todd Bliss
Pacific Grove High School
biology teacher

http://www.mbari.org/expeditions/fijilau/

Anders Warén
Sweden

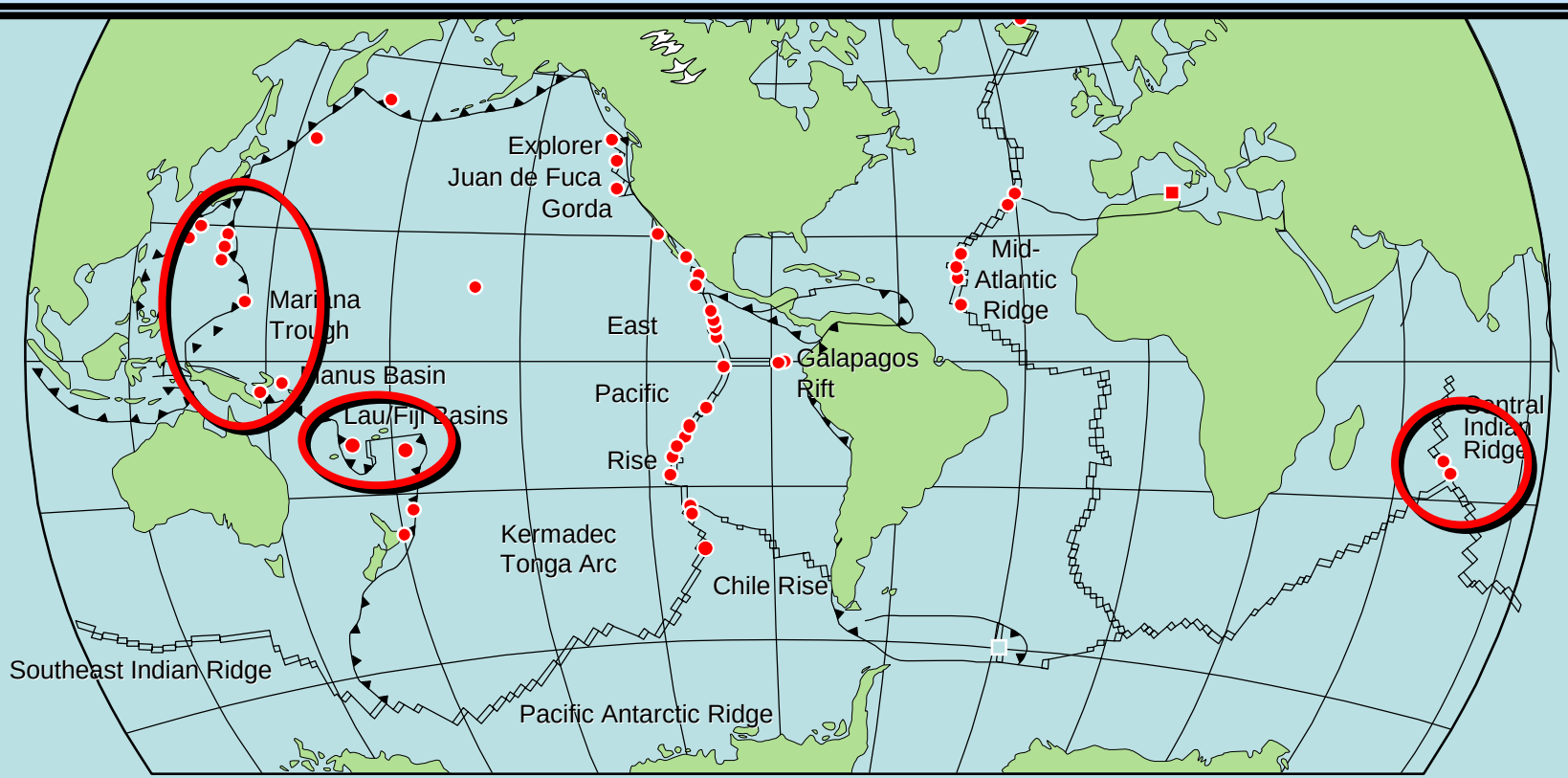
Greg Rouse
Australia

Victoria Orphan
CalTech-microbiology

Fred Pleijel
Sweden

Motivation: vent habitats are discontinuous

On what timescales do chemosynthetic taxa disperse across ocean basins?

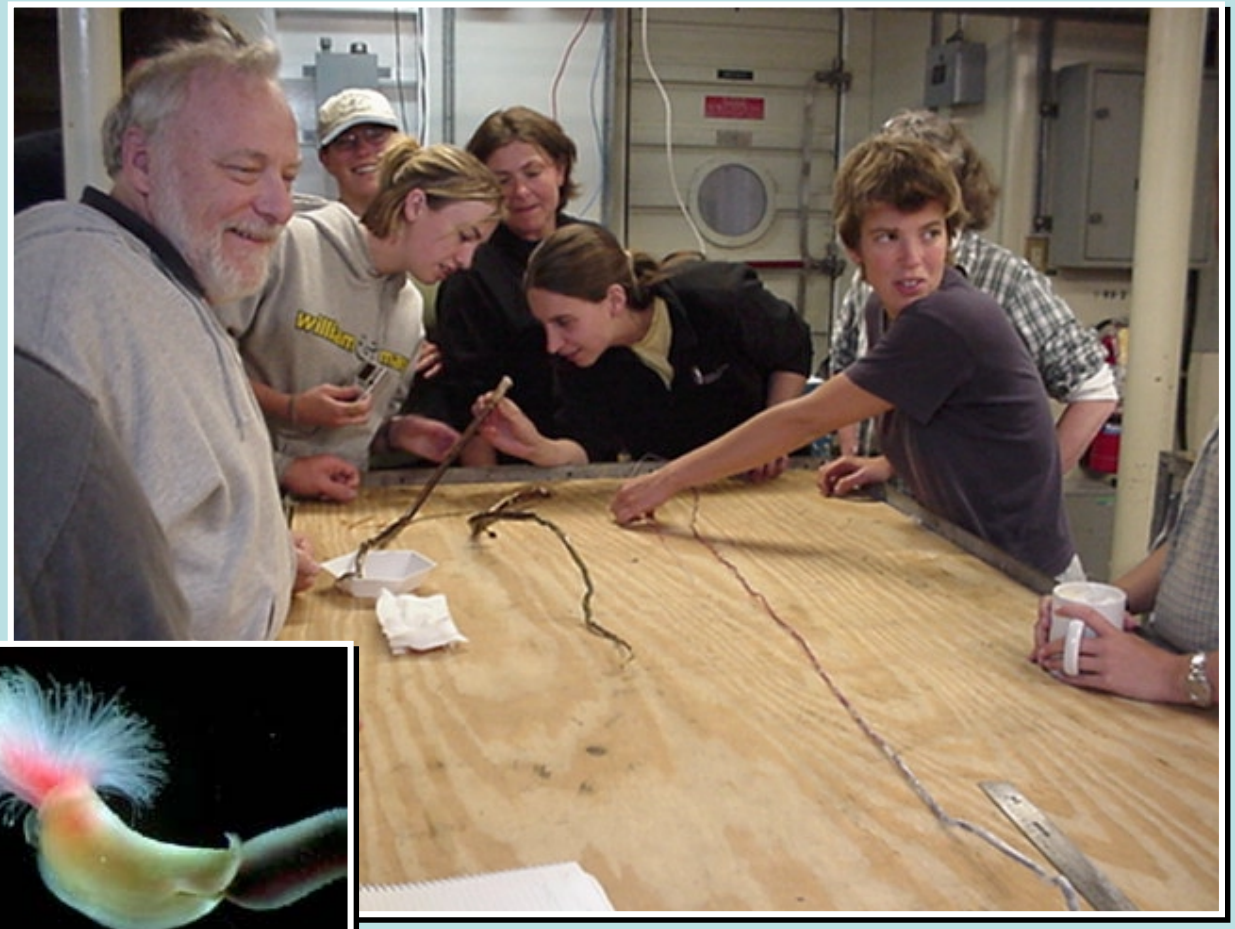


Bathymodiolus mitochondrial phylogeny

K. Jacobson

ND4 sequences
Courtesy: J. Jones

2.8 meter long *L. columna*

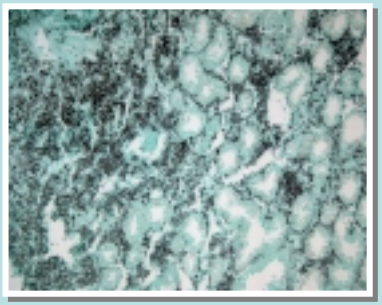


An emergent fungal disease in Fiji Basin mussels

CL Van Dover, R Carnegie, ME Ward, JL Scott
The College of William & Mary and VIMS

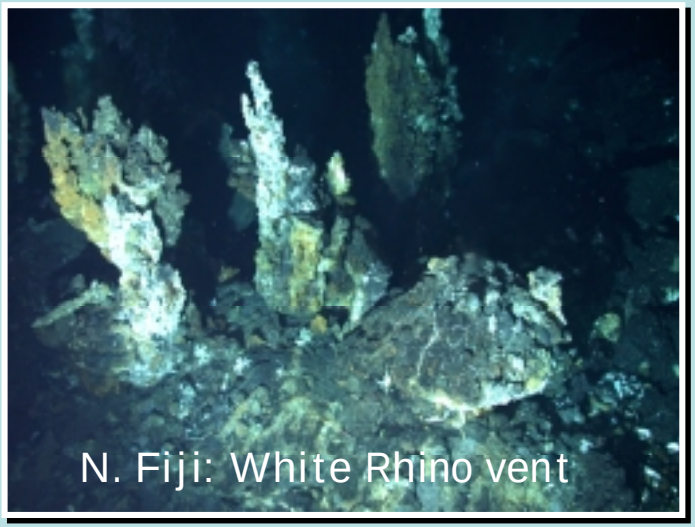
Brown-Spot Stage

Black-Body Stage



- affects connective tissue
- identified as a “black yeast”
- prevalence > 58% and pervasive tissue necrosis in infected individuals
- US deep-submergence operators notified of the potential role vehicles and gear may serve in transport of pathogen
- proposal pending to study progress of disease:
  - effects on mussel community structure
  - viability of fungus (or spores) on vehicles and collecting gear

Fiji-Lau expedition: SUMMARY


N. Fiji: White Rhino vent


Lau: Tui Malila mussel bed

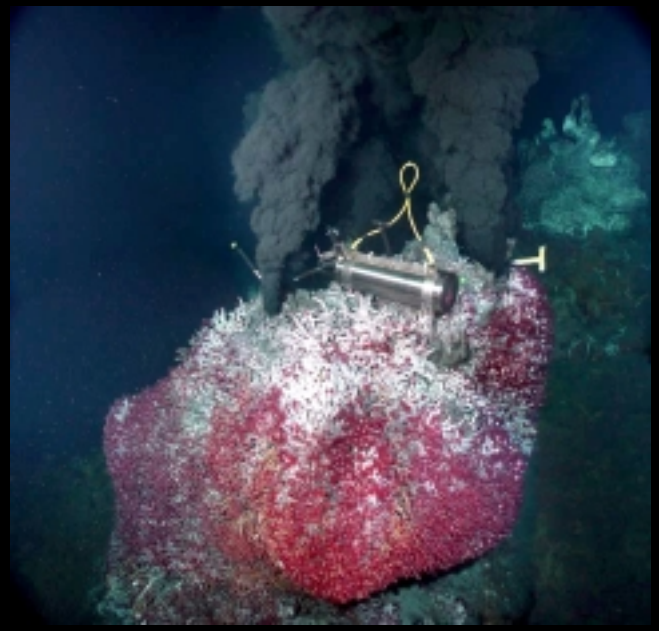
Accomplishments:

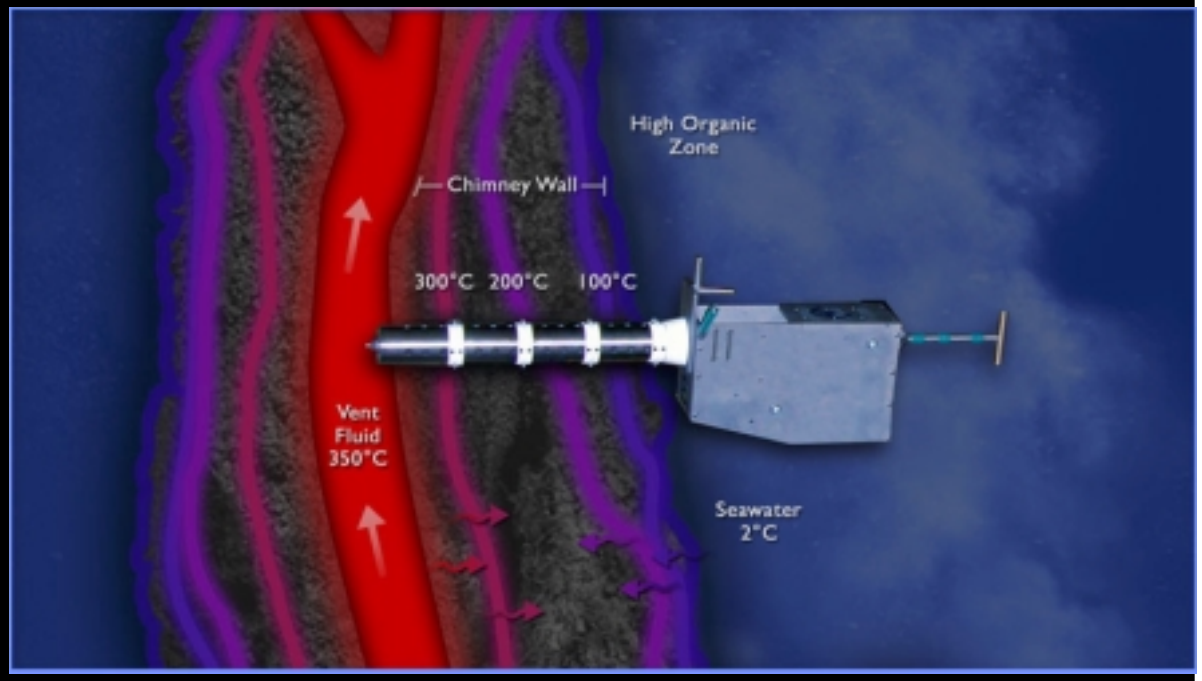
- 14 successful *Jason* dive days
- 0 dives lost to weather
- *Jason* digital video: excellent
- *Virtual Van*: excellent annotation capability
- *Jason* payload: excellent
- *Jason* pilots: excellent

What went wrong:

- No weather days scheduled
- Vacuum sampling very poor
- Recommend rotary suction sampler like harbor Branch design
- Launch crane is dangerous even at mild sea-states

JASON
September 11-September 17
Debbie Kelley
John Delaney





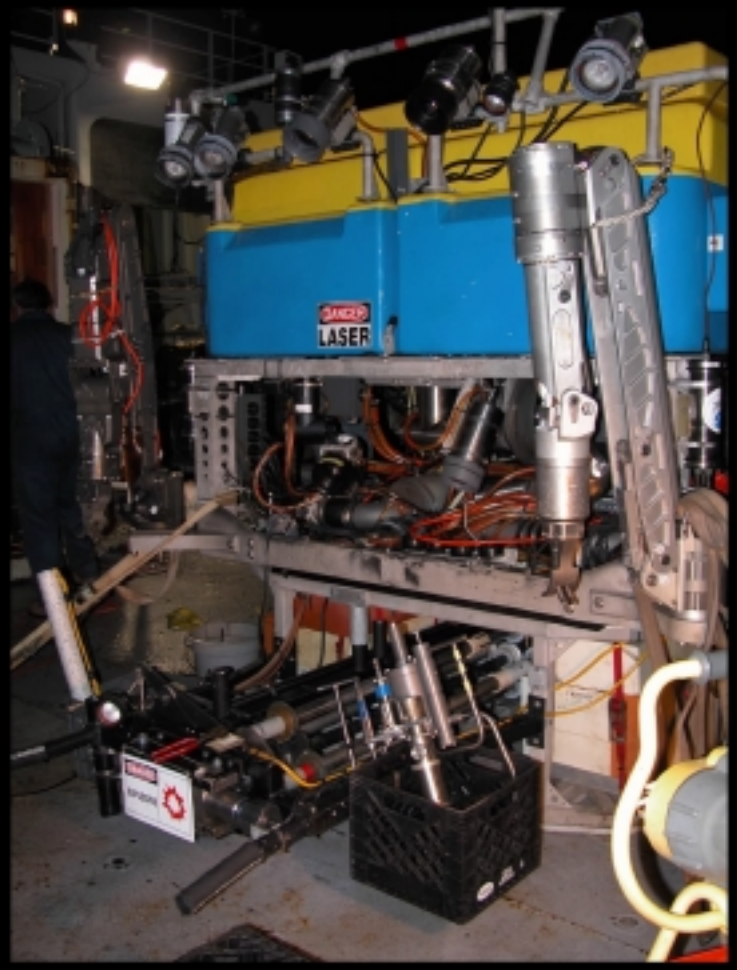
Debbie Kelley, John Delaney VISIONS05

Examining extreme conditions under which life thrives, survives expires

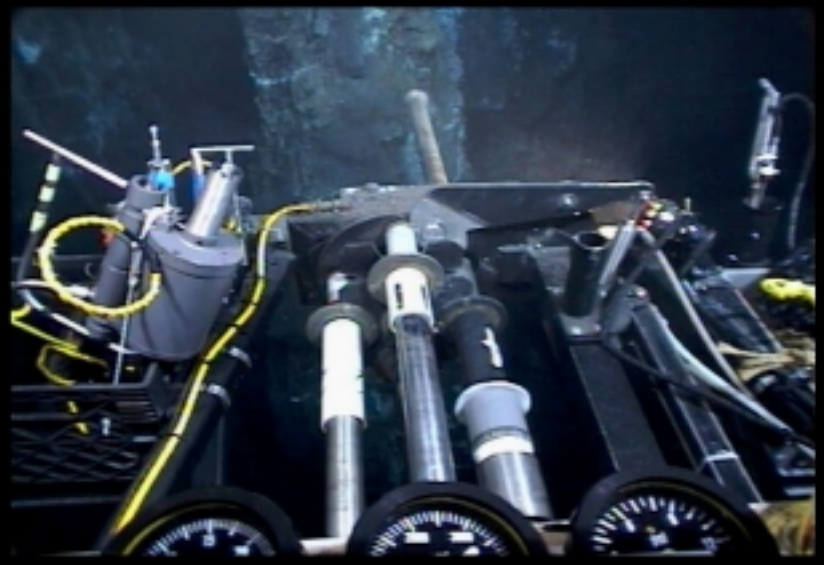
Development of microbial incubators

4 chambers, 36 temperature probes, H2, time-series sampling

3 instruments 1 mo, 2 instruments deployed for 1 year, 2 colonization 1 year, scheduled to be on Neptune Canada 2007

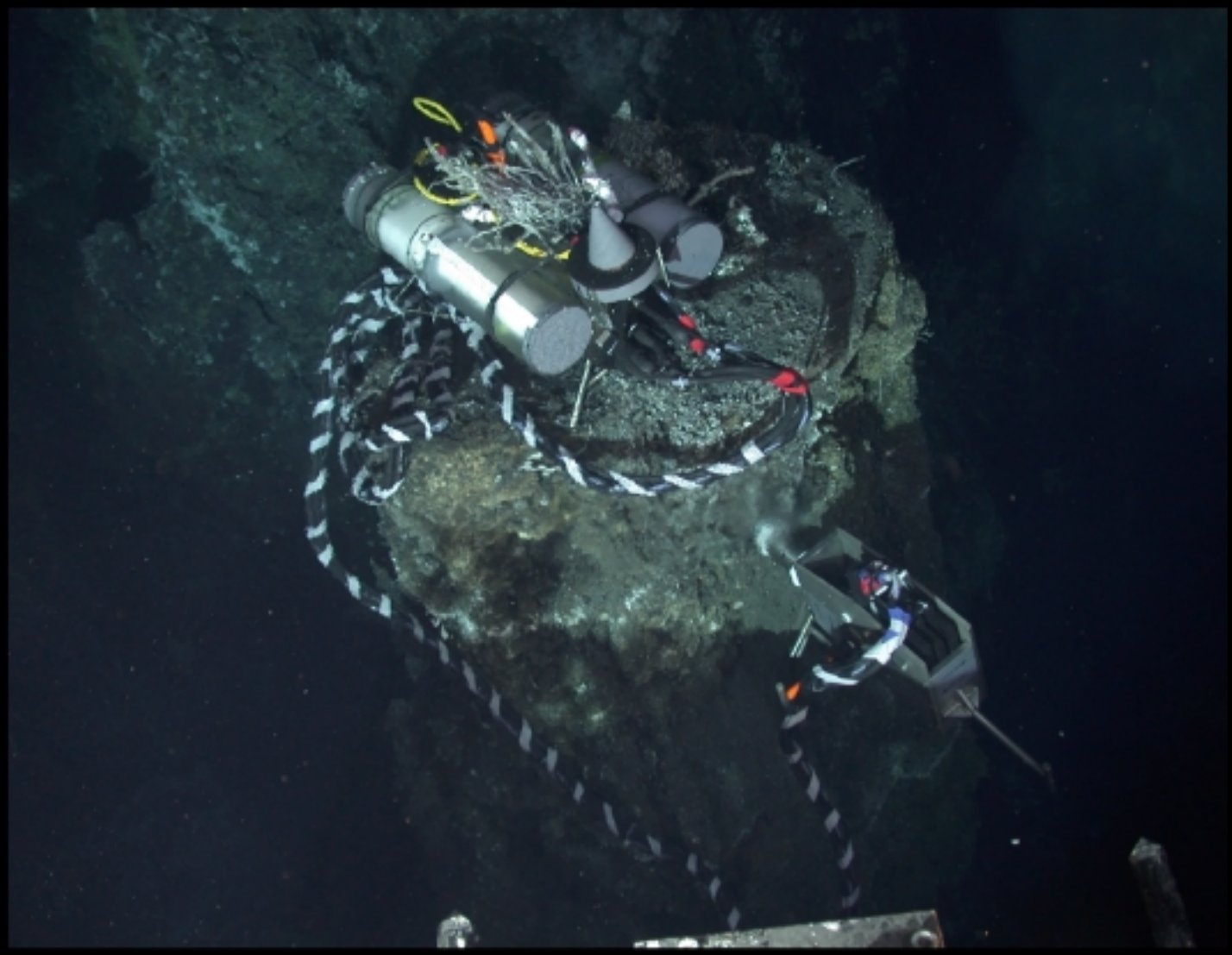


Tough conditions- drilling while flying



Decoupled coring assembly

Completed all objectives with successful holes in Roane, Giraffe, Hulk, Gremlin; 3 incubators deployed, 3 colonization experiments



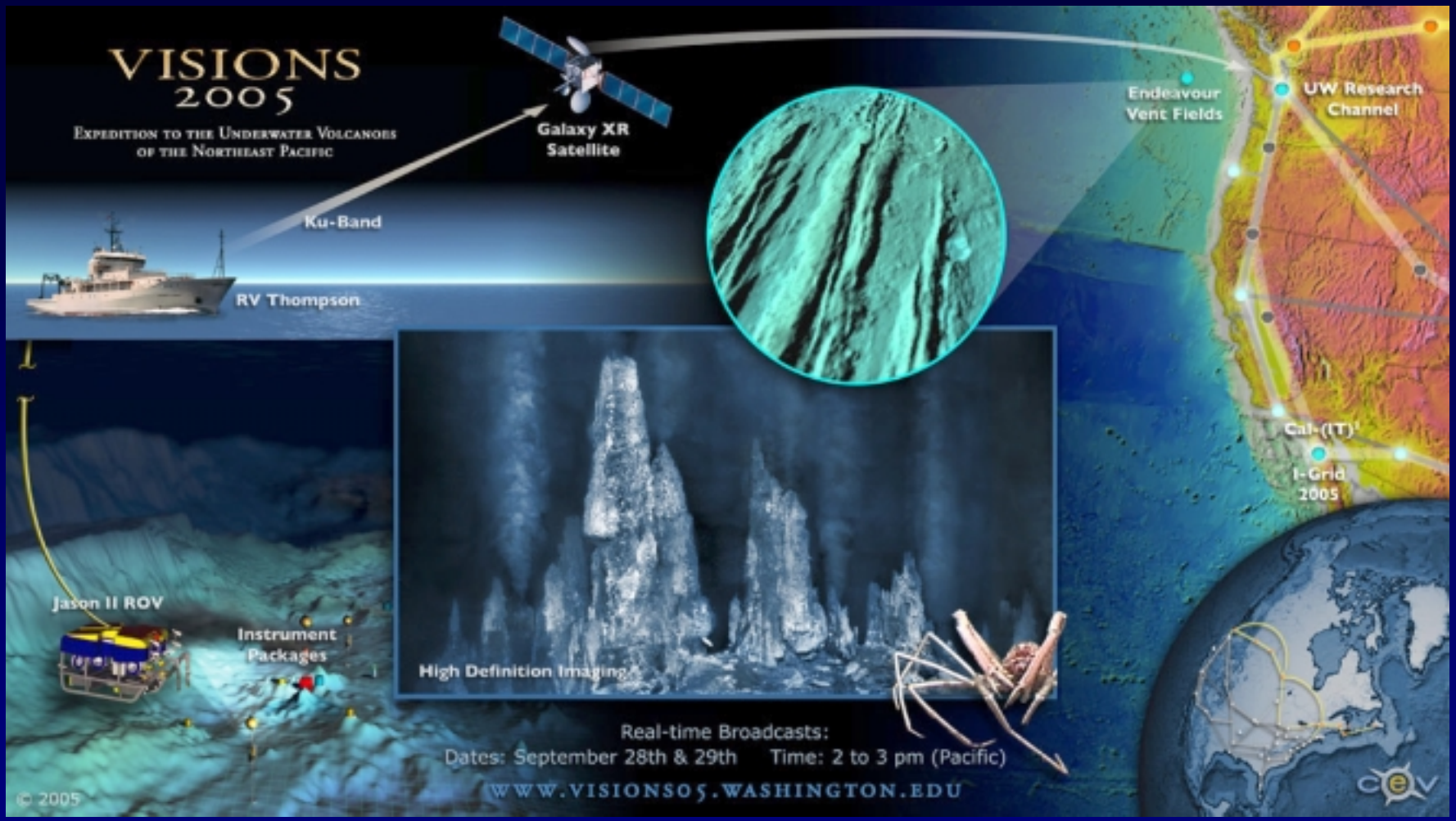
Tough to drill and fly

Should consider system without Medea

Need a dedicated ship for J2-launch mid ship

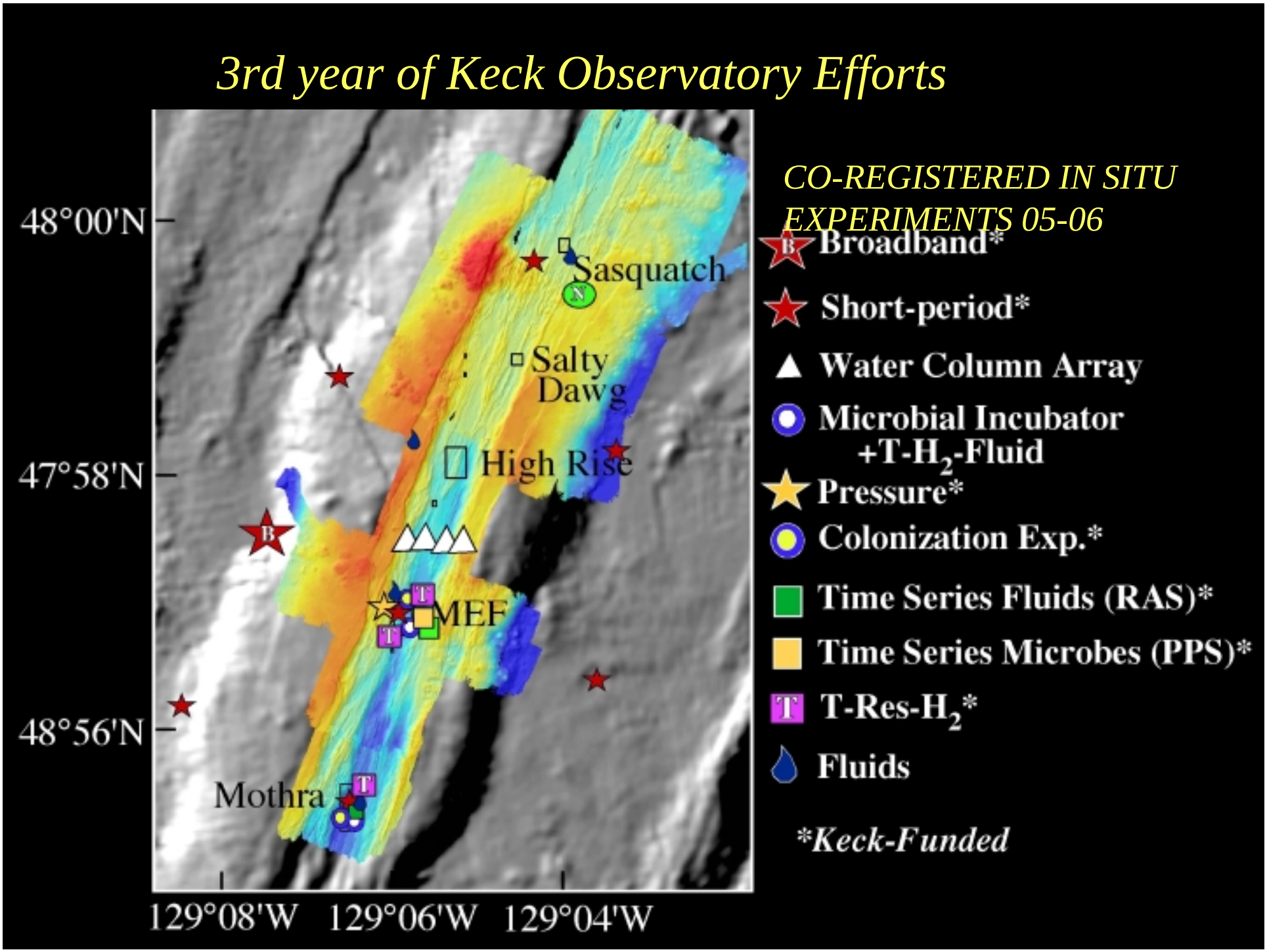
JASON
September 18-October 4
John Delaney
Debbie Kelley

VISIONS05

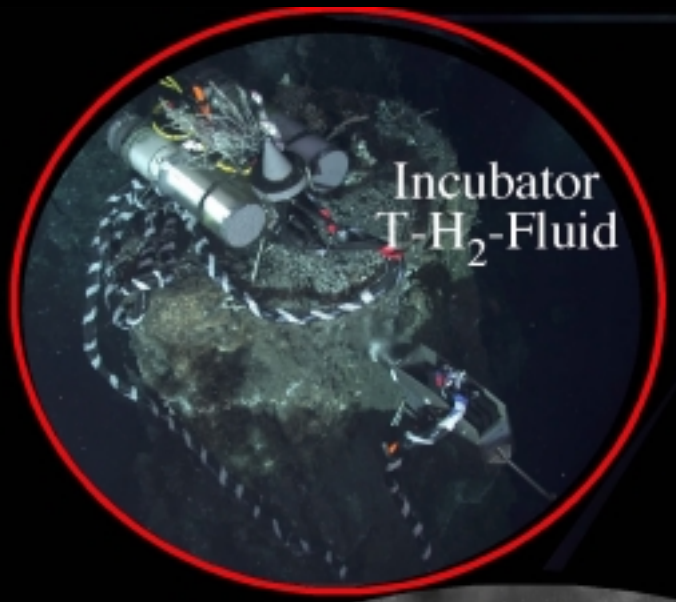


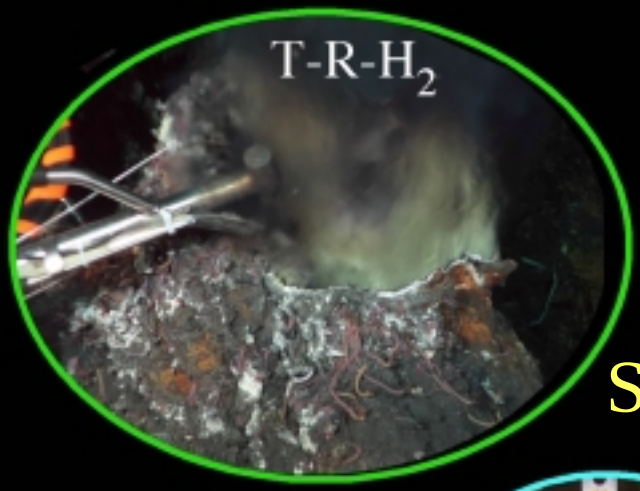
First HD Transmission from the seafloor-across US, Canada, Australia, Tokyo
REVEL Program 5 middle-high school teachers, 1 mentor
Completion of KECK-funded proto-Neptune Observatory: Installation of 20 in situ Seismic instruments, chemical, thermal, and biological sensors 3rd year

3rd year of Keck Observatory Efforts



Mothra: Faulty Towers Time-Series Observatory



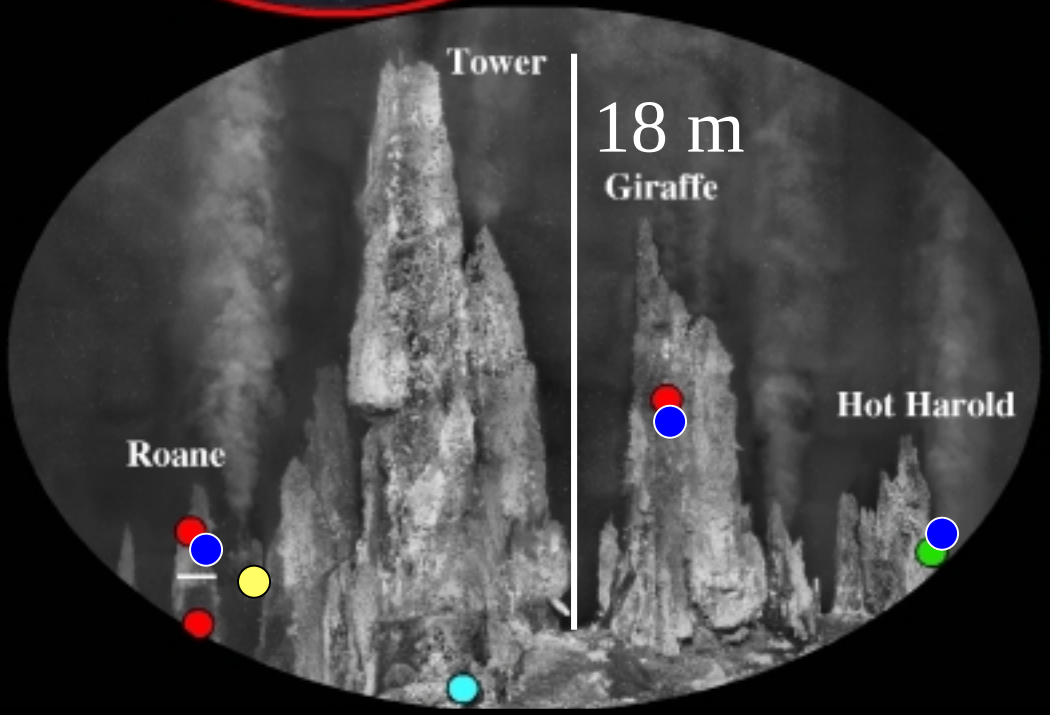


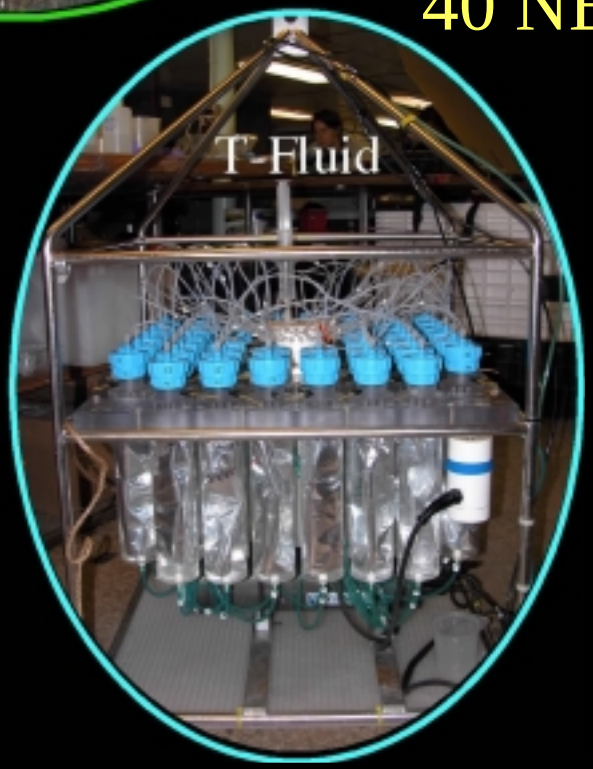
Sulfide

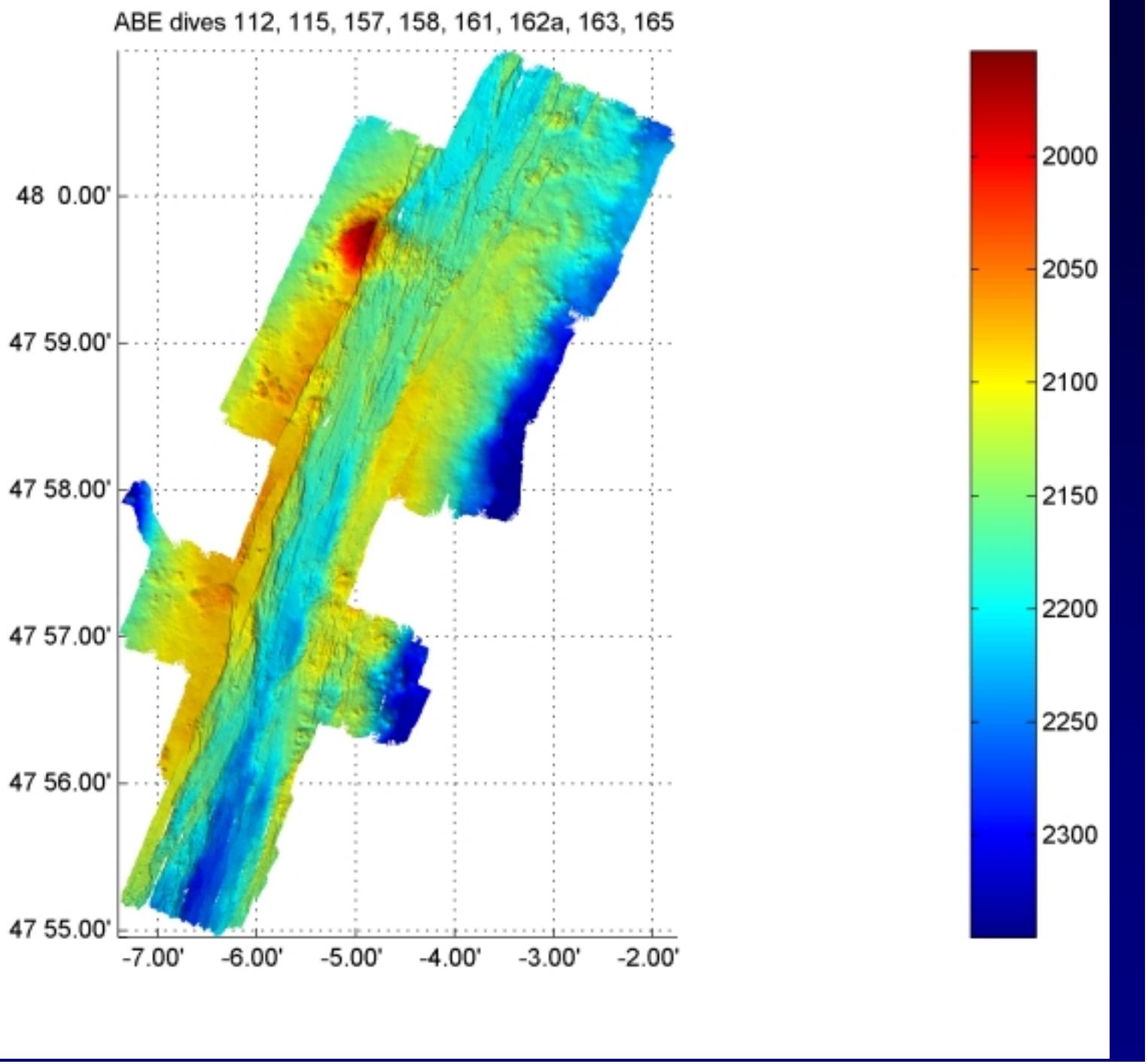
Fluids

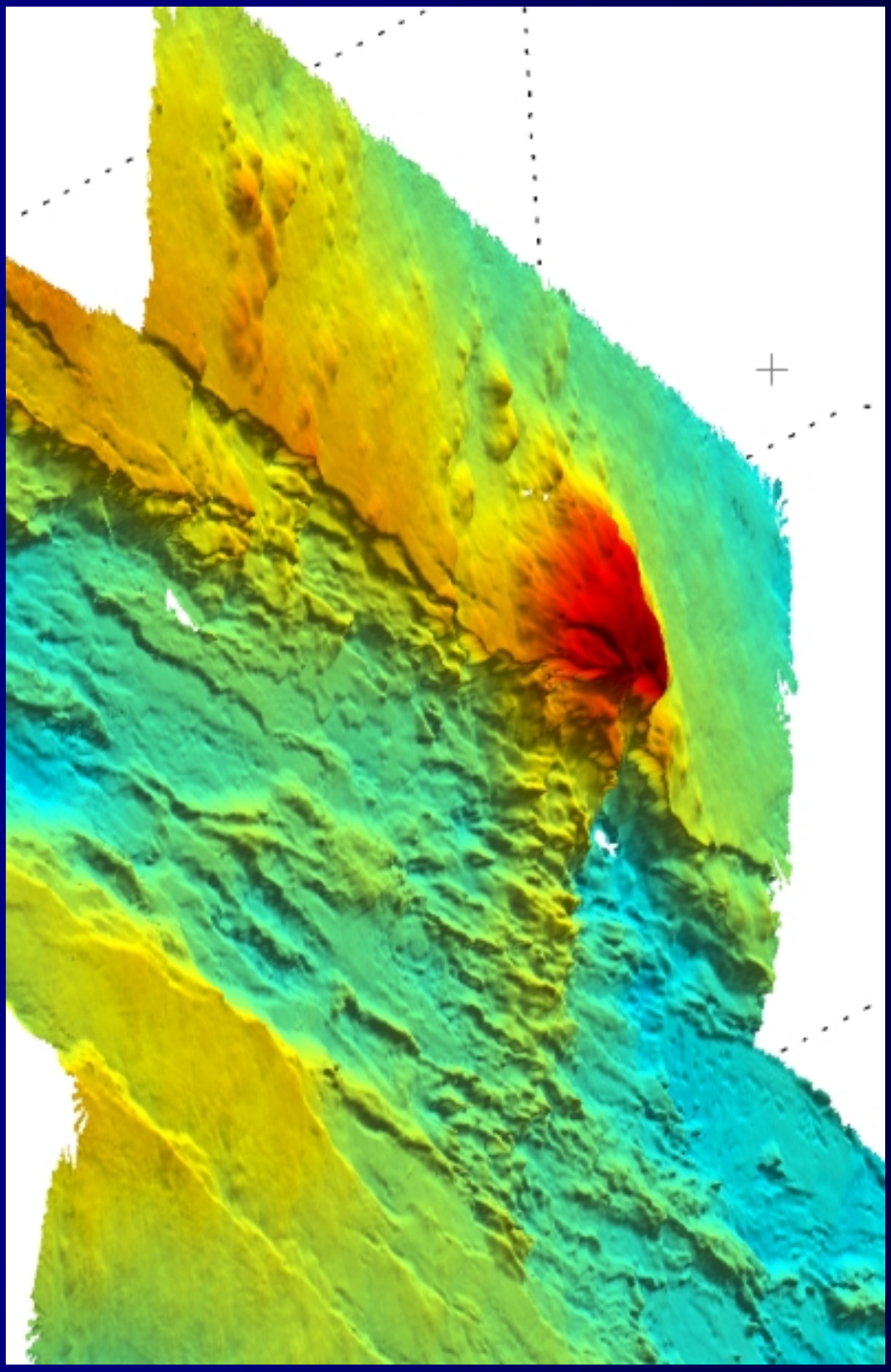
Short-Period

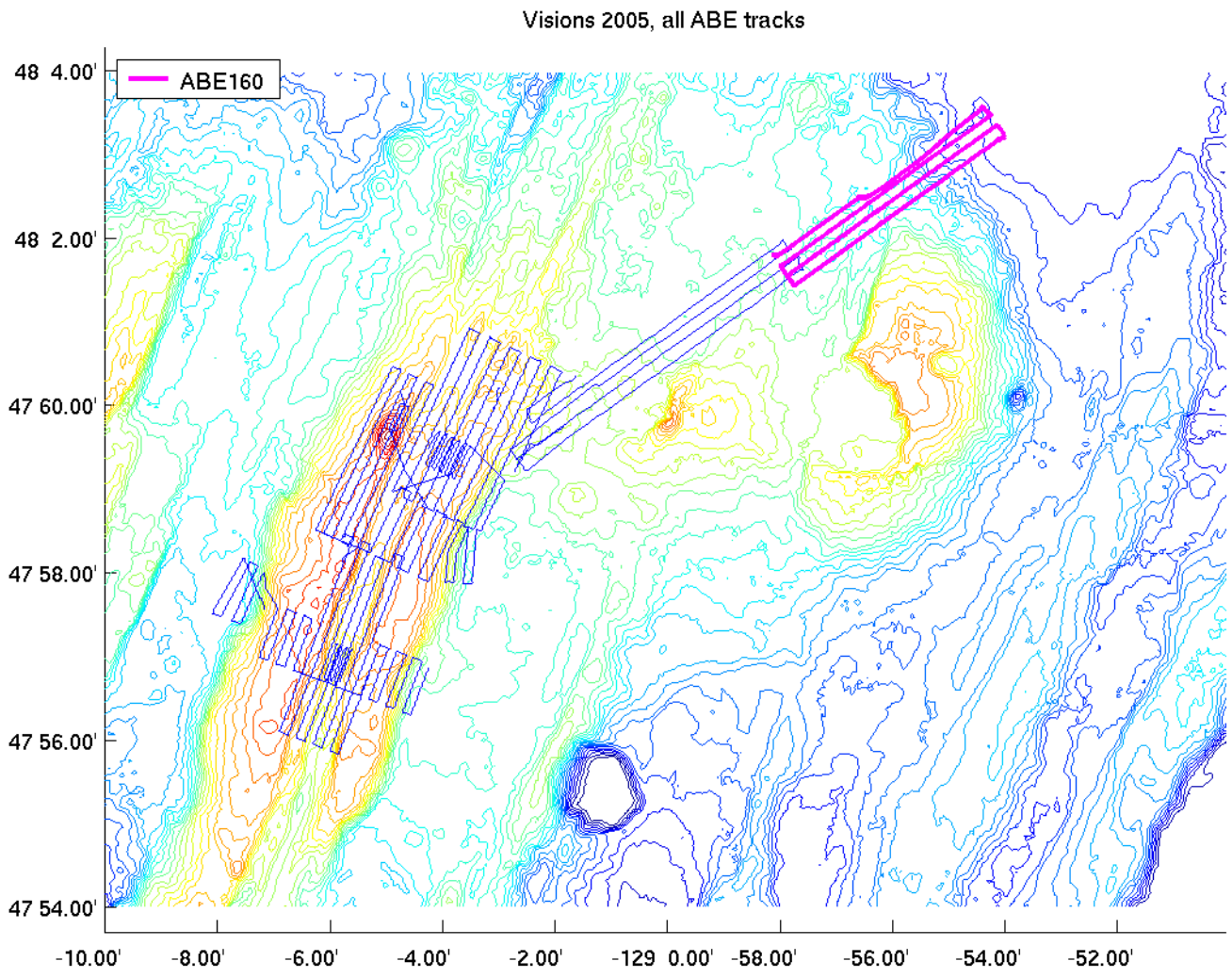
40 NE






ABE dives 112, 115, 157, 158, 161, 162a, 163, 165
48 0.00'
47 59.00'
47 58.00'
47 57.00'
47 56.00'
47 55.00'
-7.00'
-6.00'
-5.00'
-4.00'
-3.00'
-2.00'
2000
2050
2100
2150
2200
2250
2300





Survey tracklines ABE dives 157-165

ABE operations, VISIONS05

- Mapped the cable route approaching axial valley
- Mapped the axial valley from 47° 56’ to 48° 01’N
- ABE operated simultaneously with Jason2:
  - Launch before or during Jason2 dive
  - ABE “sleeps” until Jason dive completed
  - Battery recharge, transponder ops conducted during Jason2
  - Shared acoustic net in rudimentary fashion.

JASON
November 4 - November 17
Ken Smith