High Resolution Portable Multi Channel Seismic

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UC San Diego

Equipment

Hydrophone Streamers

- 48 Channel solid GeoEel
  - 6.25m group spacing
  - Vib-Iso section
- 48 Channel liquid GeoEel
  - 12.5m group spacing
  - Vib-iso sections

UC San Diego

Equipment

Digicourse Bird Streamer Level

UC San Diego

Equipment

Acoustic Sources

- 2xGI Acoustic Sources
  - Up to 105 cu. inches each
  - Towed in single or double GI hangers
  - Spare third GI source

UC San Diego

Equipment

Equipment

Acoustic Source Signature

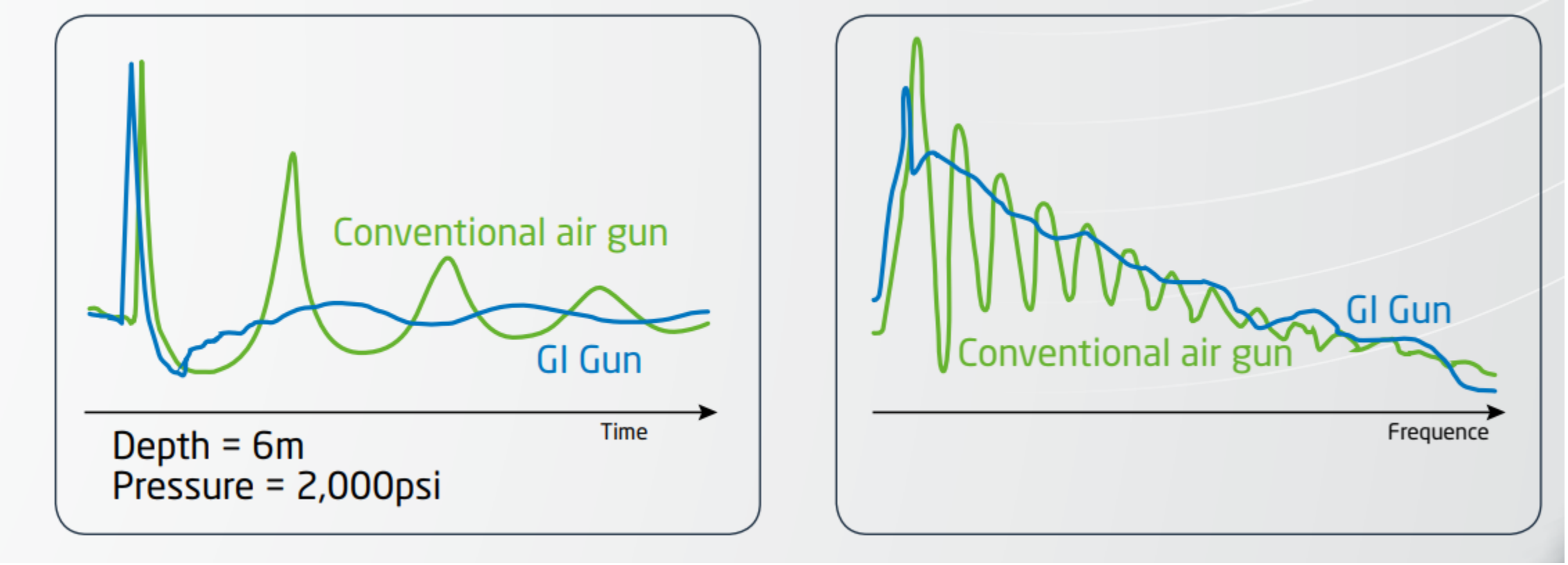
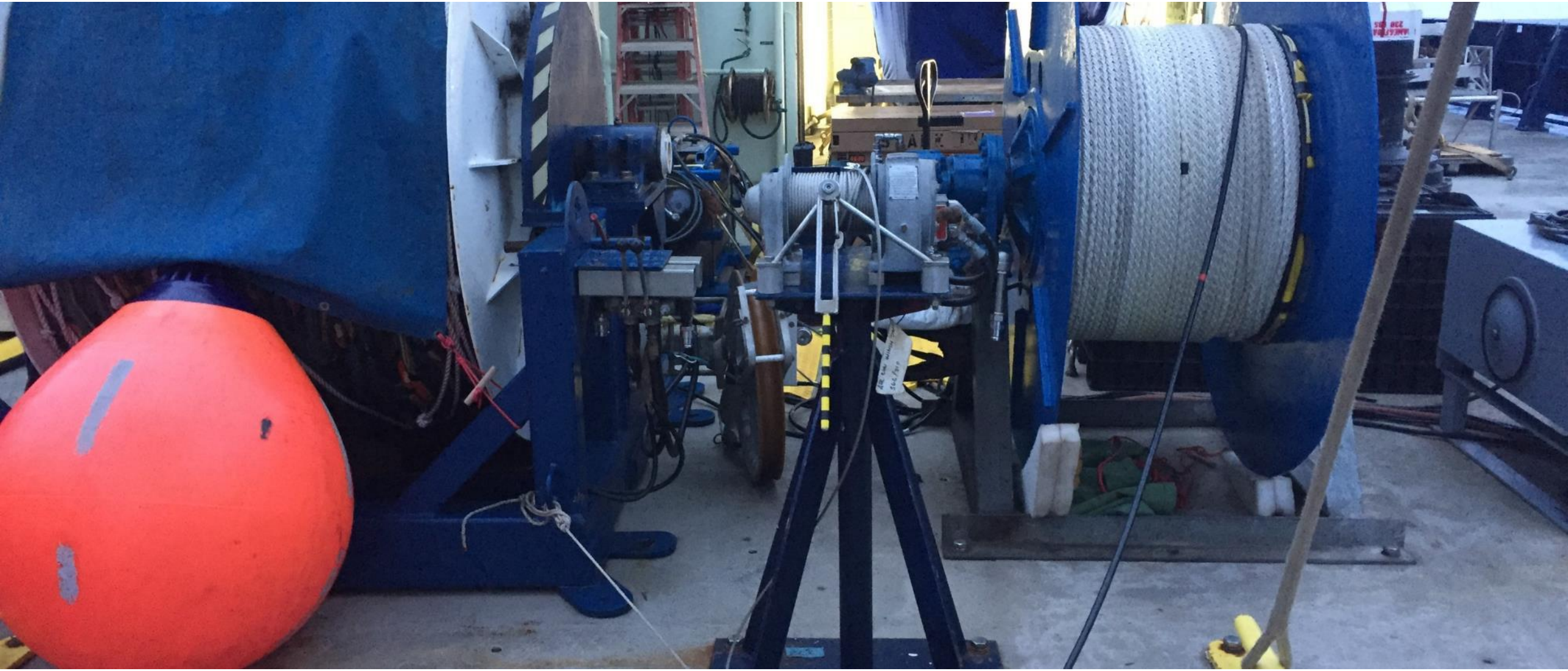


Figure provided by Sercel

Equipment



MCS Winches and HPU on the Atlantis

Equipment

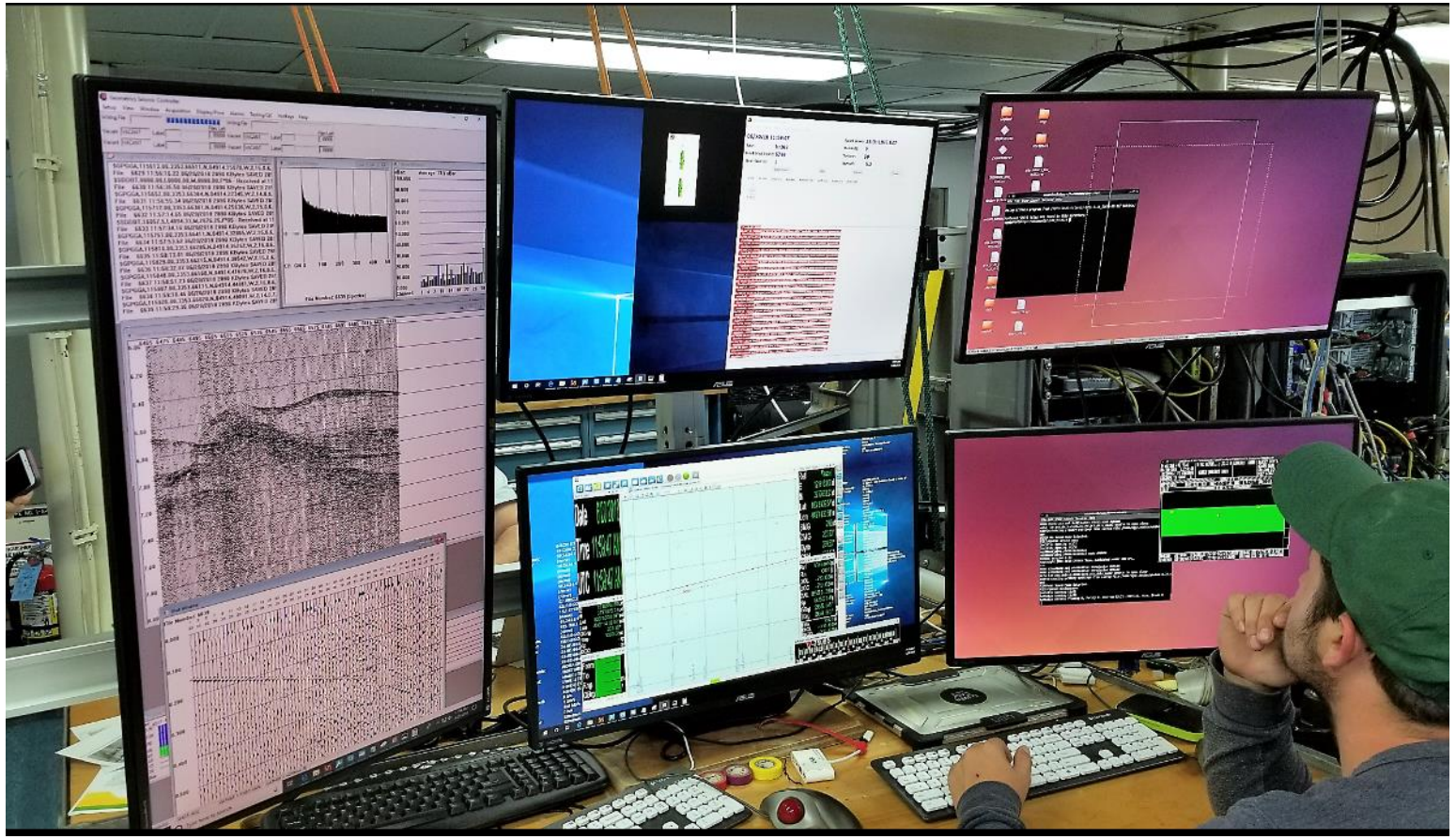
Protected species mitigation

- Big eyes
- Night vision devices
- Reticule binoculars

Equipment

Data acquisition systems

- Seismic Recorder
- Source Controller
- Navigation
- Realtime Scripts
- Bird Controller



Equipment

Data acquisition systems

- Seismic Recorder
- Source Controller
- Navigation
- Realtime Scripts
- Bird Controller.

Vessels

R/V Revelle (SIO)
R/V Melville (SIO)
R/V Sharp (UD)
R/V Atlantis (WHOI)
R/V Endeavor (URI)
R/V Wecoma (OSU)
RRS James Cook (NERC)
B/O Francisco de Ulloa (CICESE)

Project Support Services

- Shipping/logistics
- Environmental permitting
- EA's, IHA's, 90 day reports

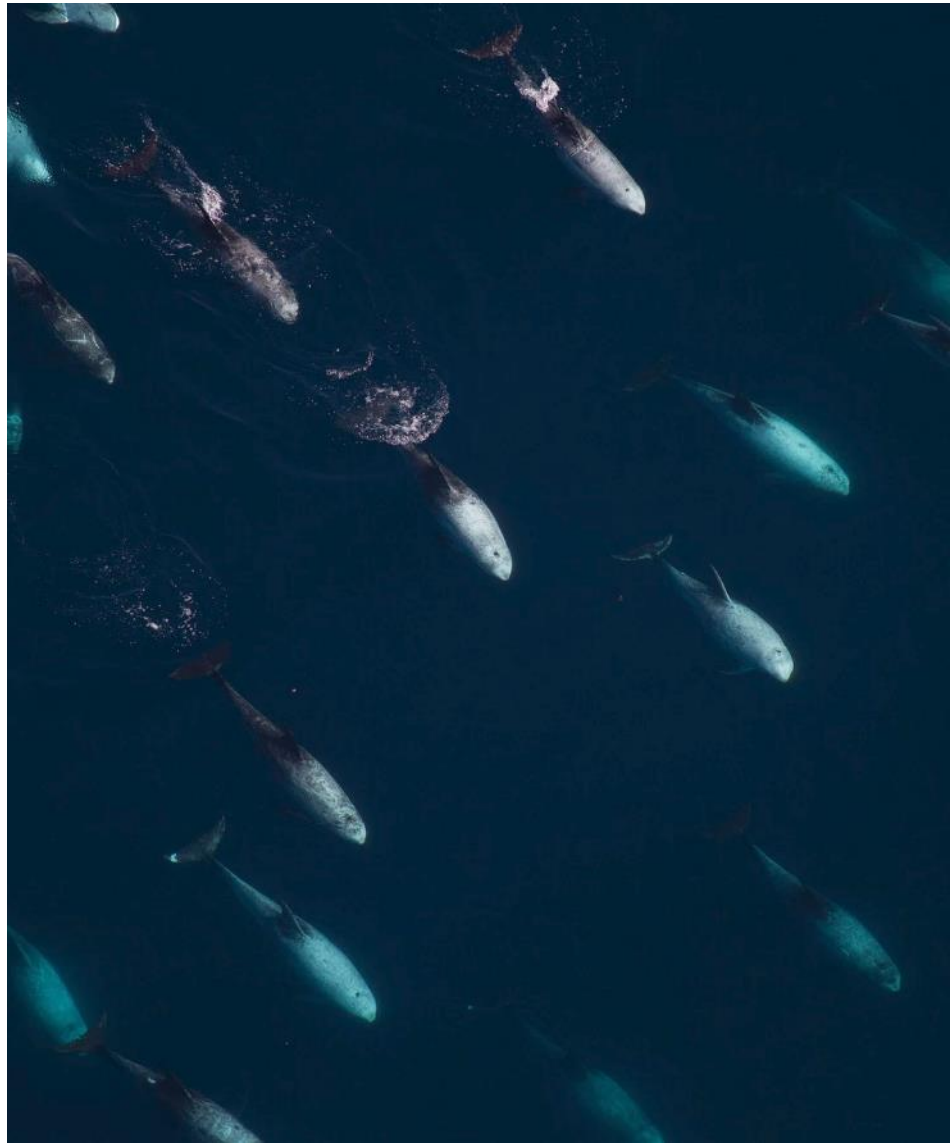


Image provided by Smultea Sciences

Early Career Scientist Cruise

PC: Rebecca Fowler

Early Career Scientist Cruise

~ 770 km high resolution Acoustic Imagery of Cascadia Margin (“unmapped” area)

- Seismogenic zone plate boundary
- Gas hydrate distribution
- Submarine fan evolution
- Deciphering climate signals

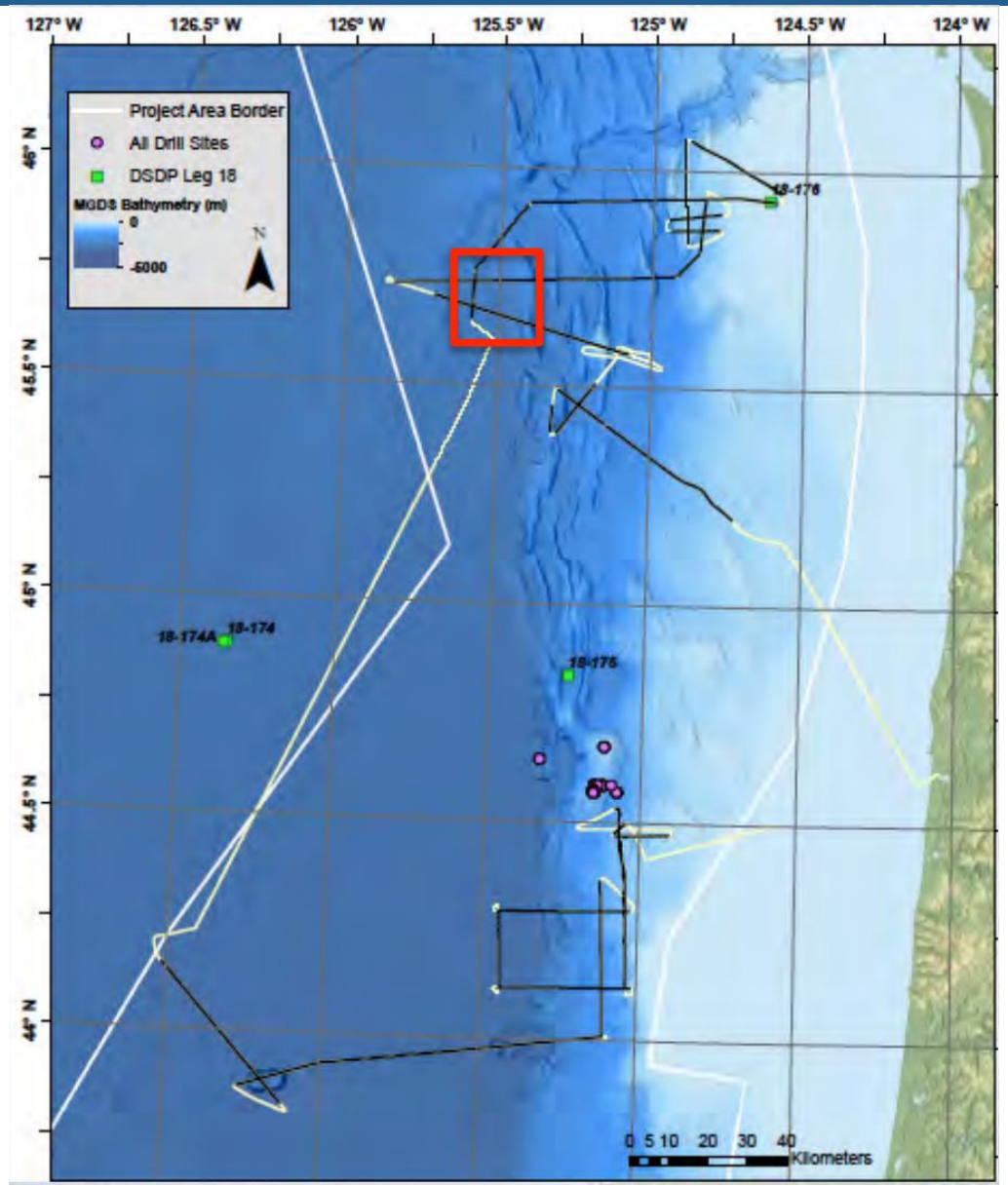


Image Provided by Emily Schoenfels, Brendan Reilly, John Schmeltz, and RR1718 participants.

Early Career Scientist Cruise

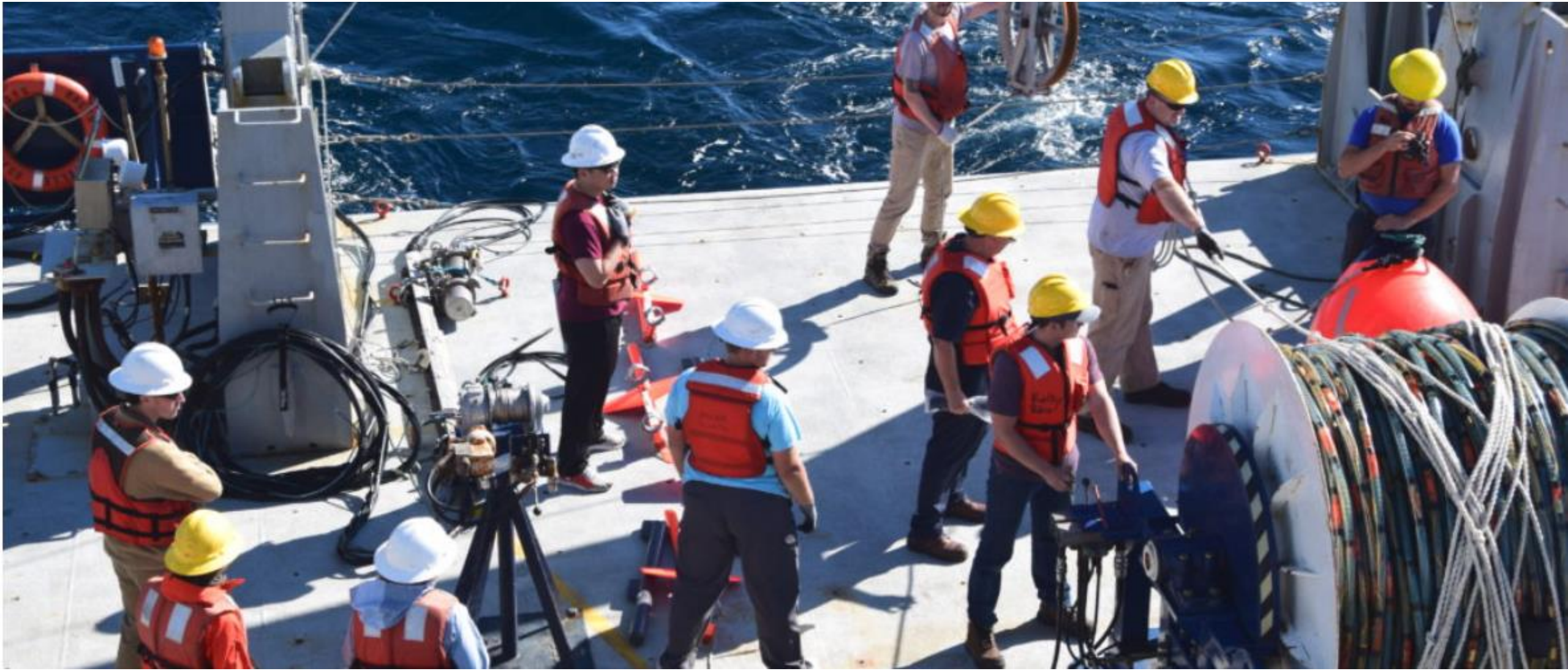


Photo: Rebecca Fowler

Early Career Scientist Cruise

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Early Career Scientist Cruise

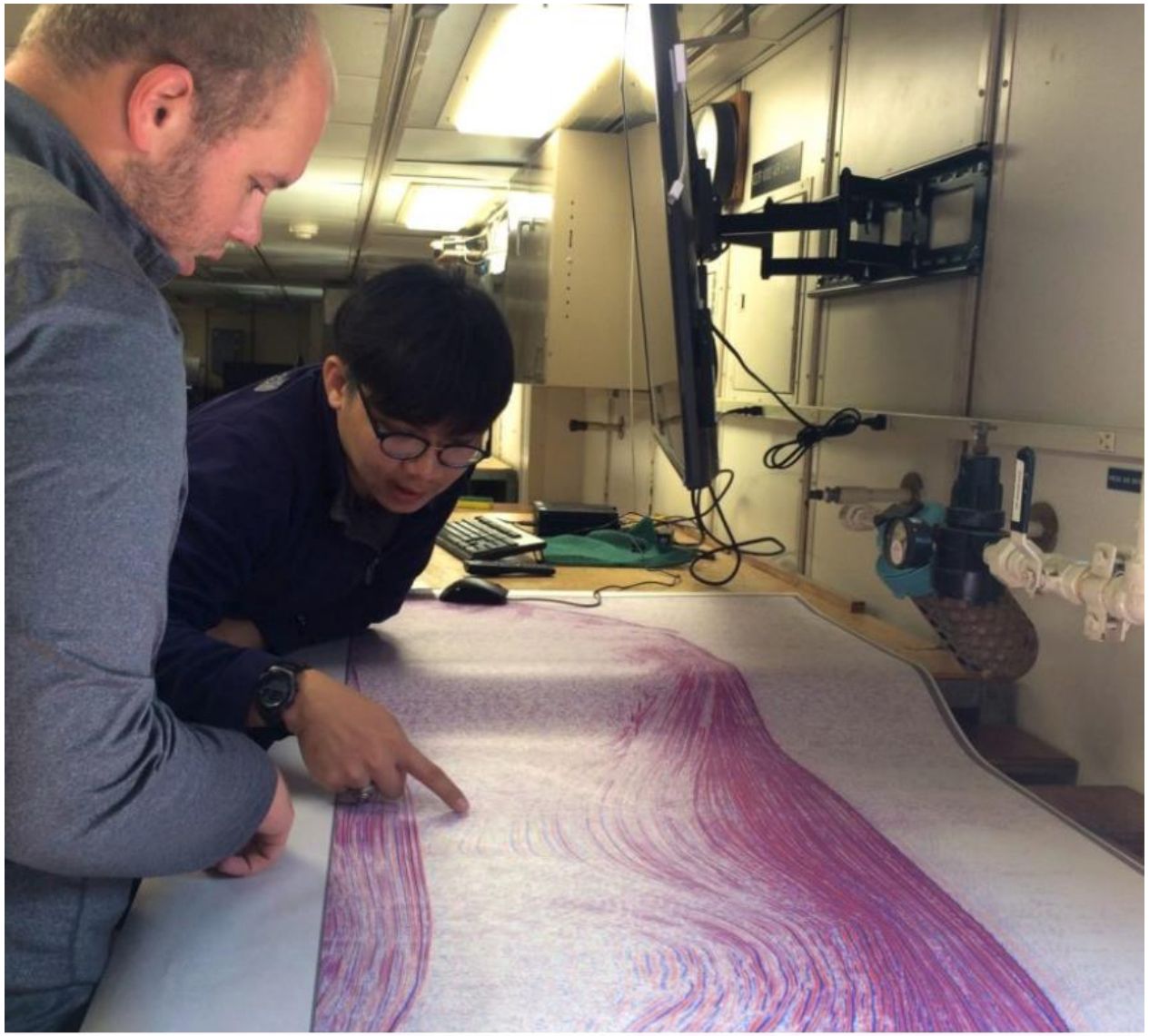

Photo: Rebecca Fowler

Early Career Scientist Cruise

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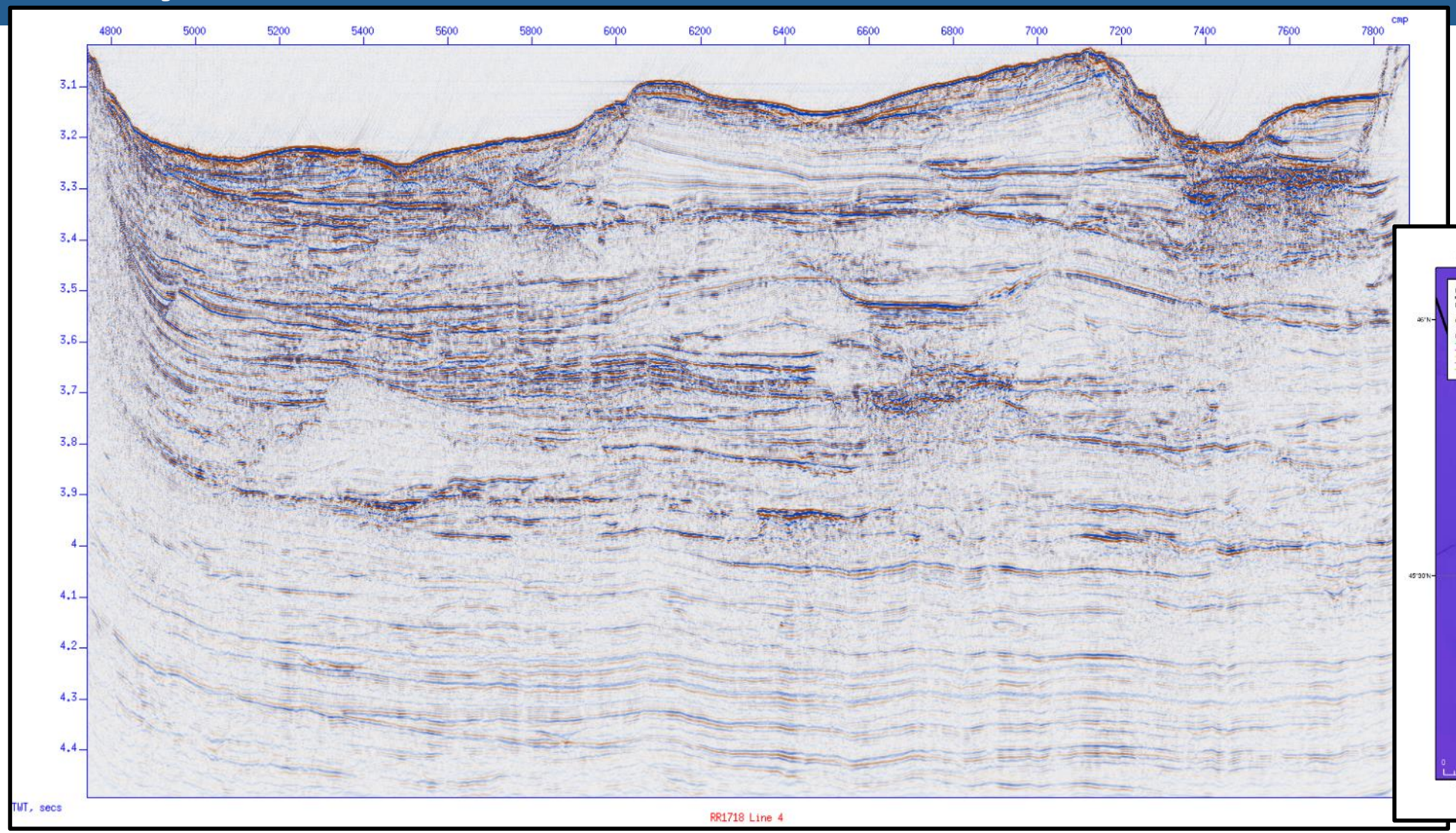
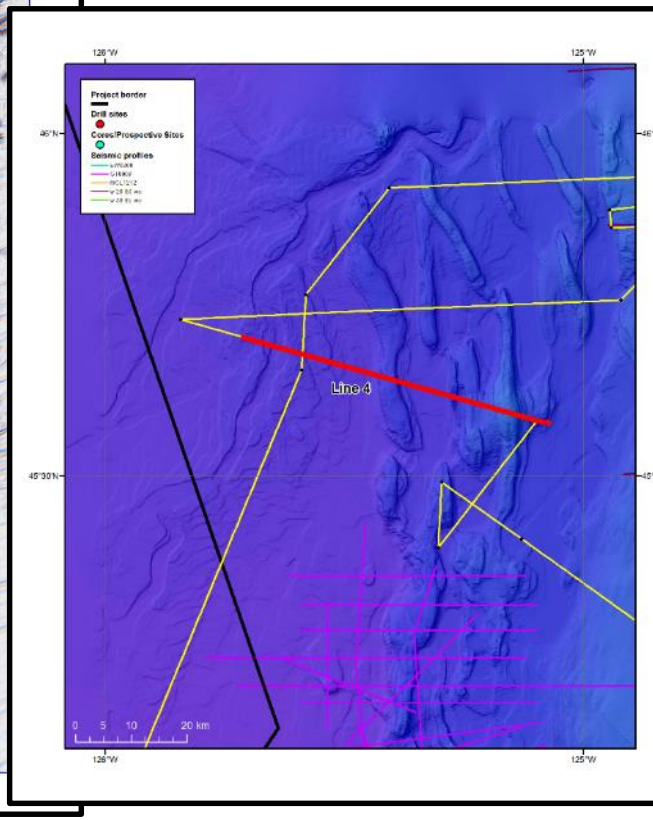
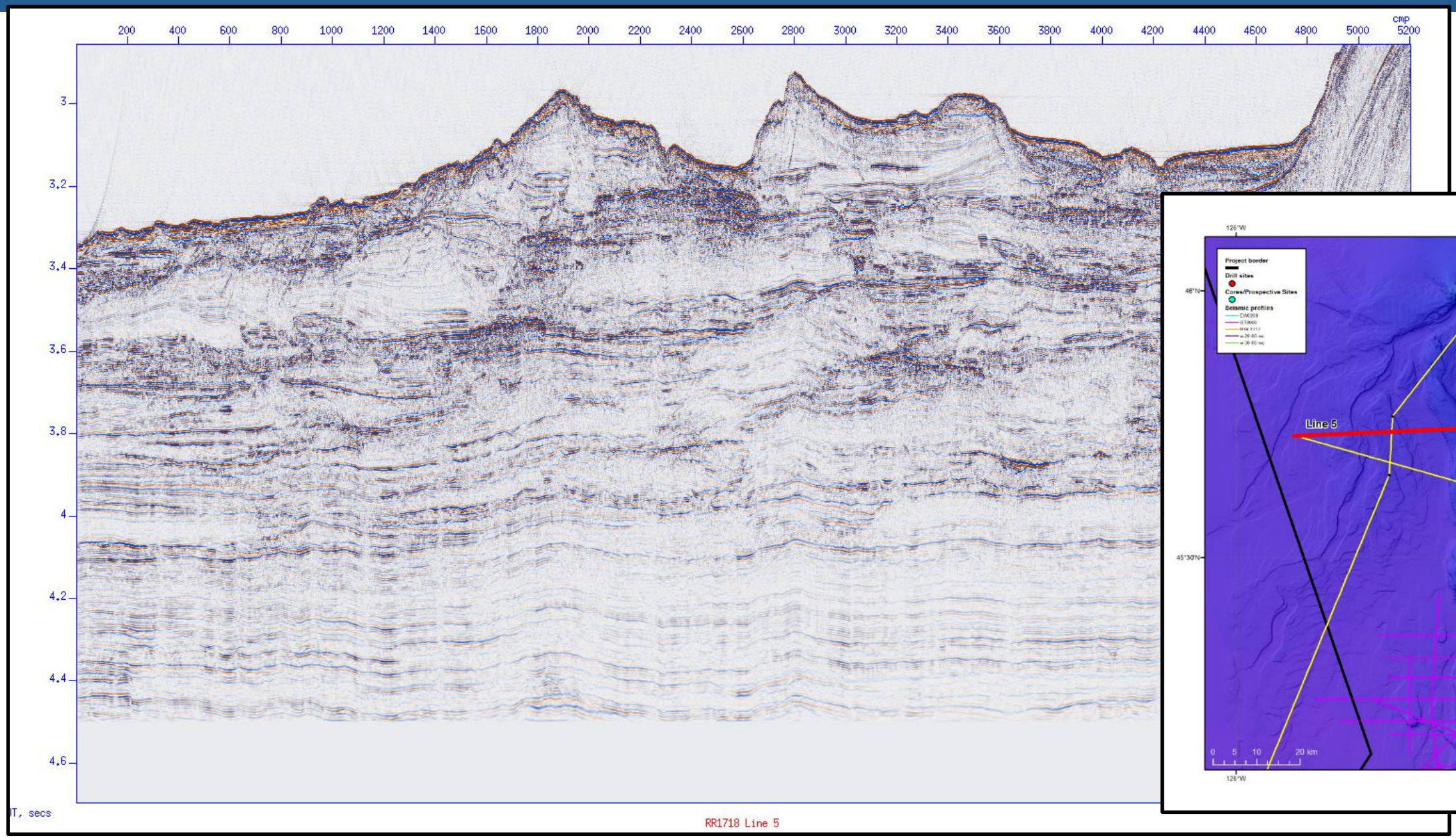
Early Career Scientist Cruise



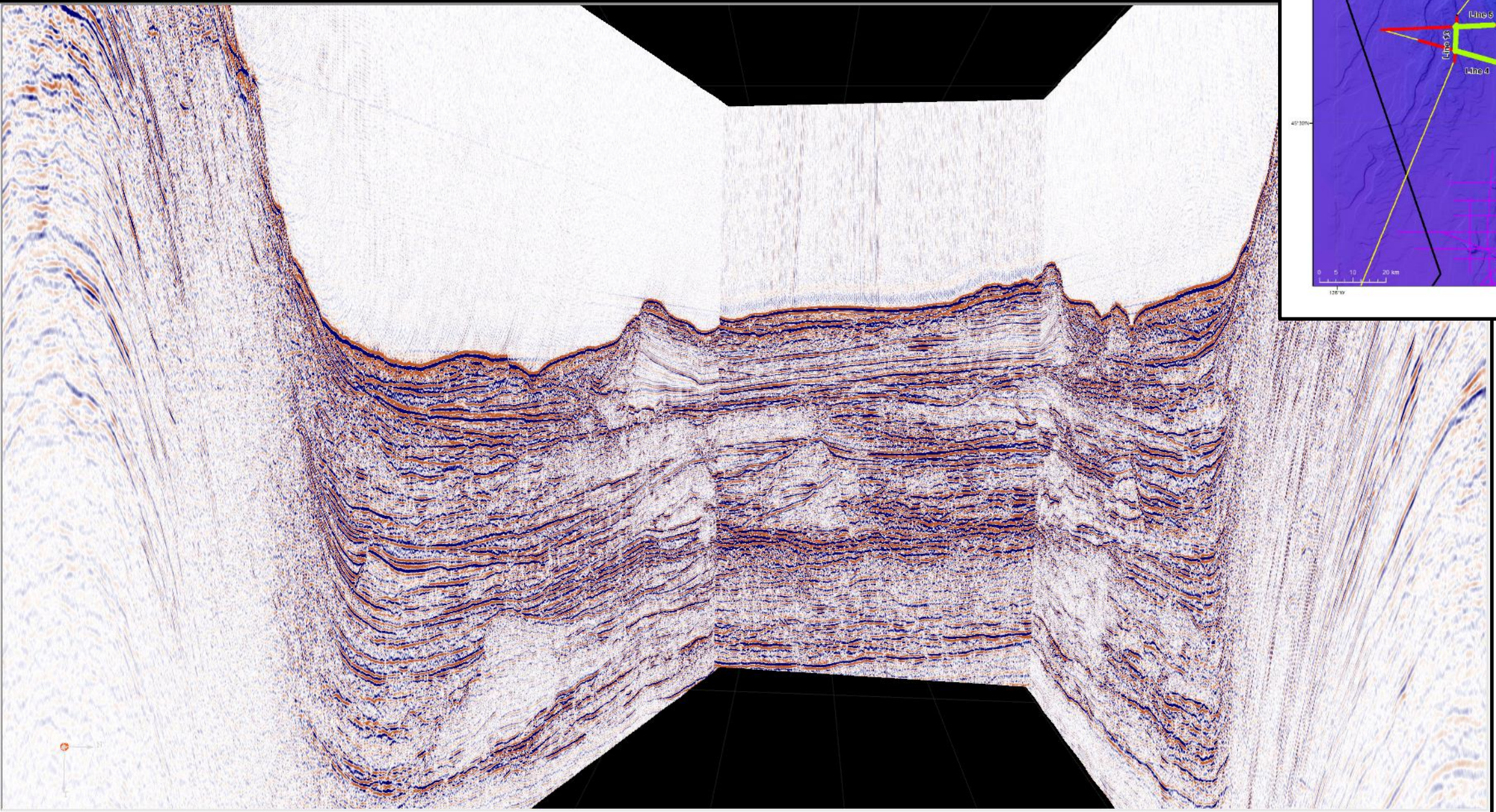


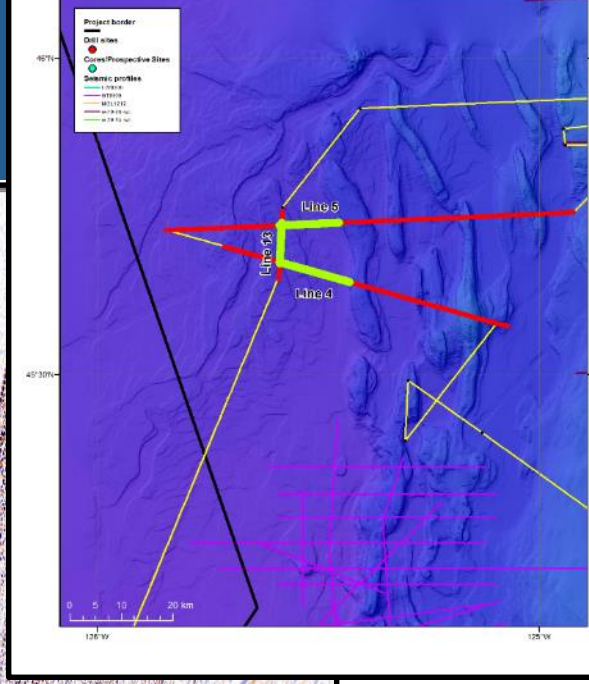
Figures provided by John Schmelz and Gregory Mountain (Rutgers University), and RR1718 Seismic ECS Cruise Participants

Early Career Scientist Cruise



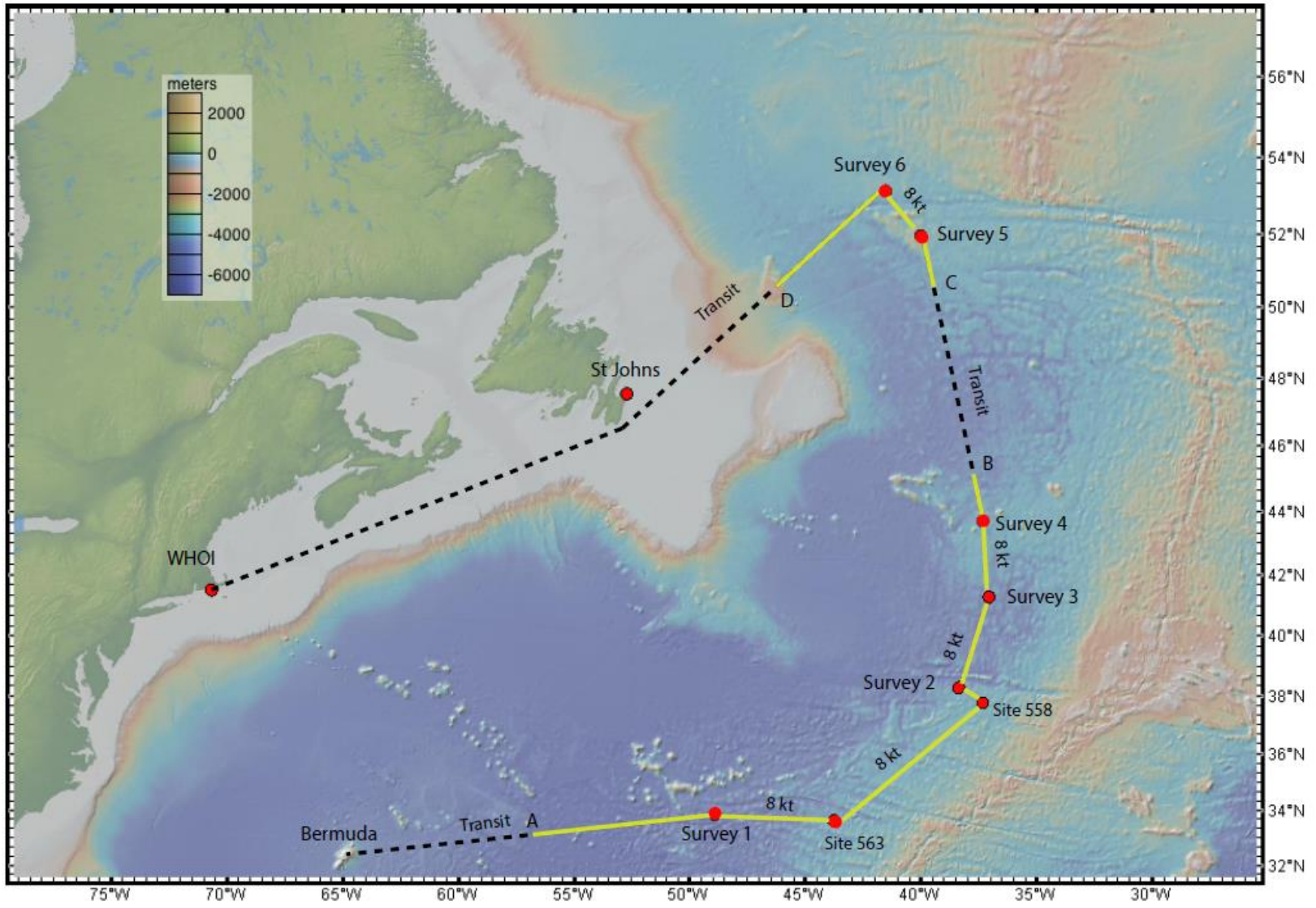
Early Career Scientist Cruise





AT40-03: IODP Site Survey

Evaluation of proposed International Ocean Discovery Program drilling sites



AT40-03: IODP Site Survey

Locate drill sites to obtain continuous records of N. Atlantic climate change

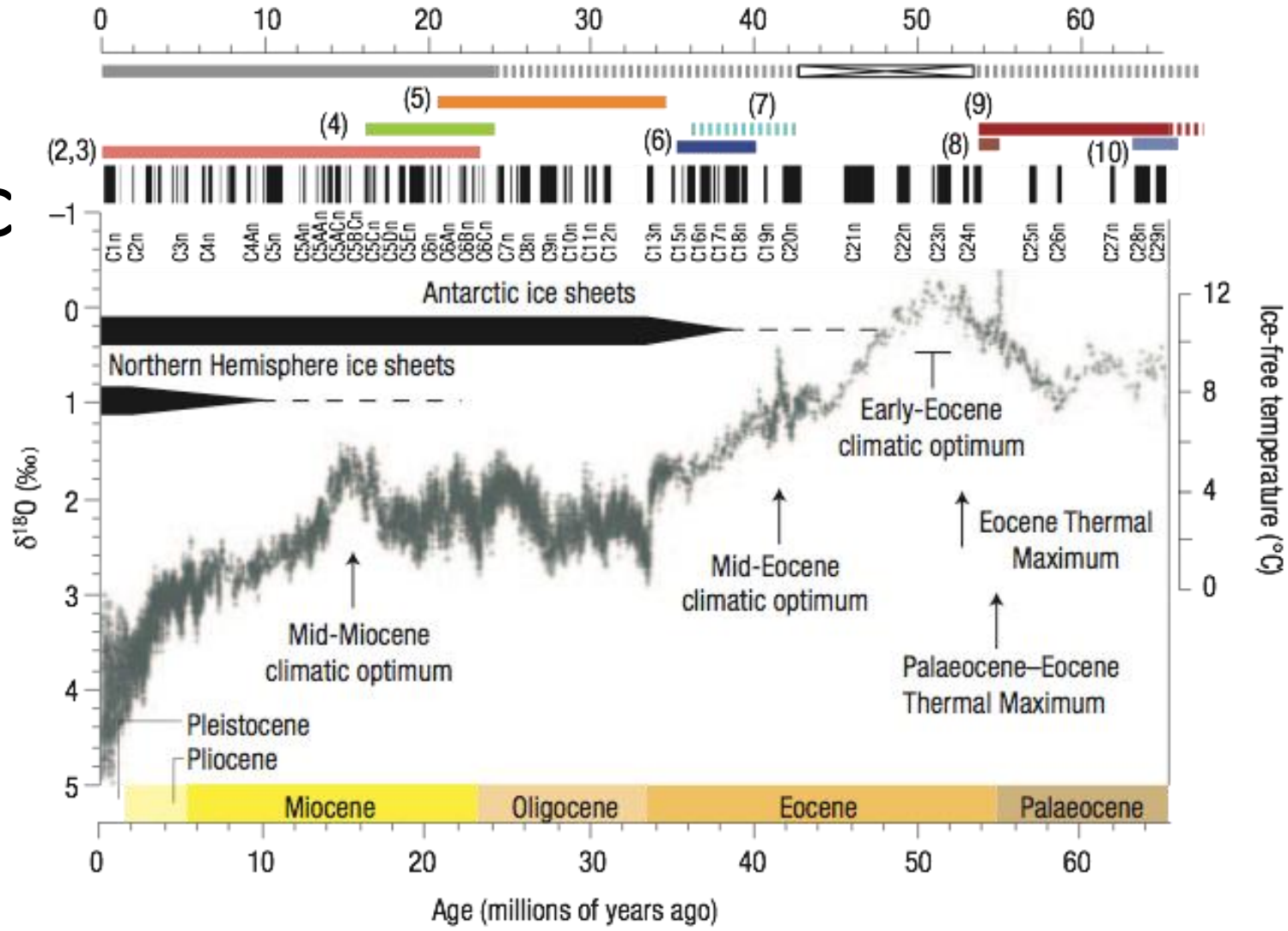


Figure provided by Mitch Lyle

AT40-03: IODP Site Survey

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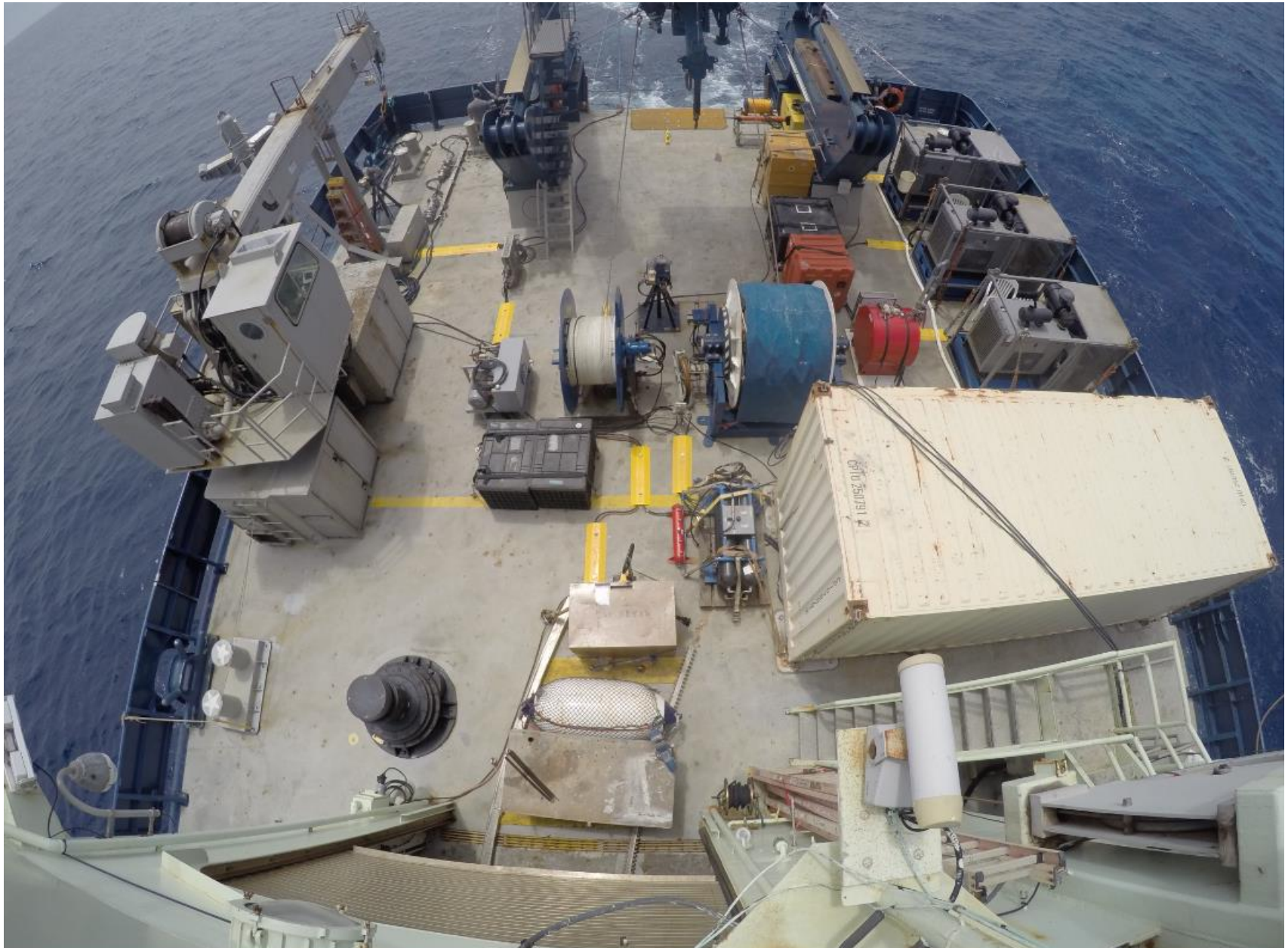


AT40-03: IODP Site Survey

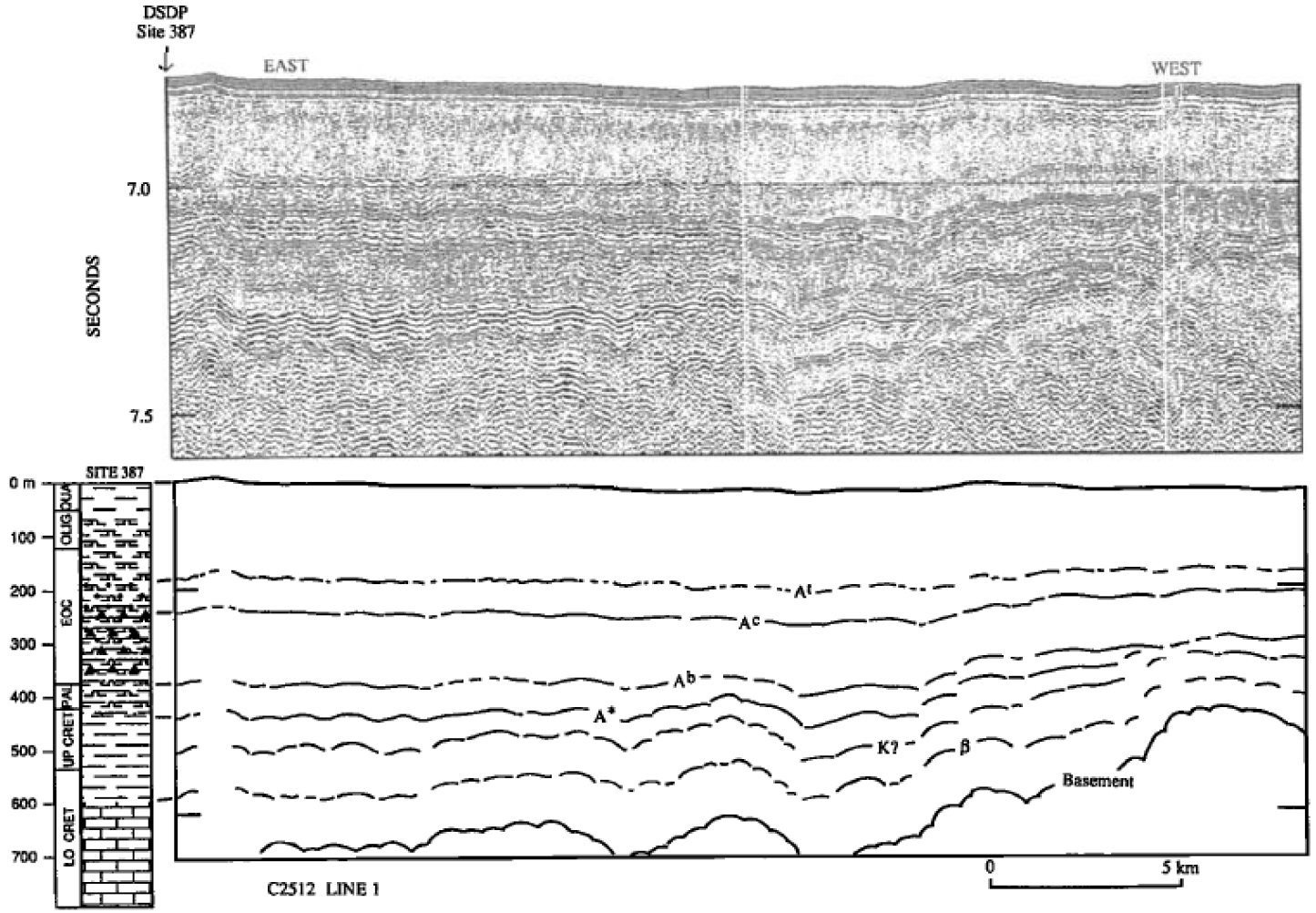
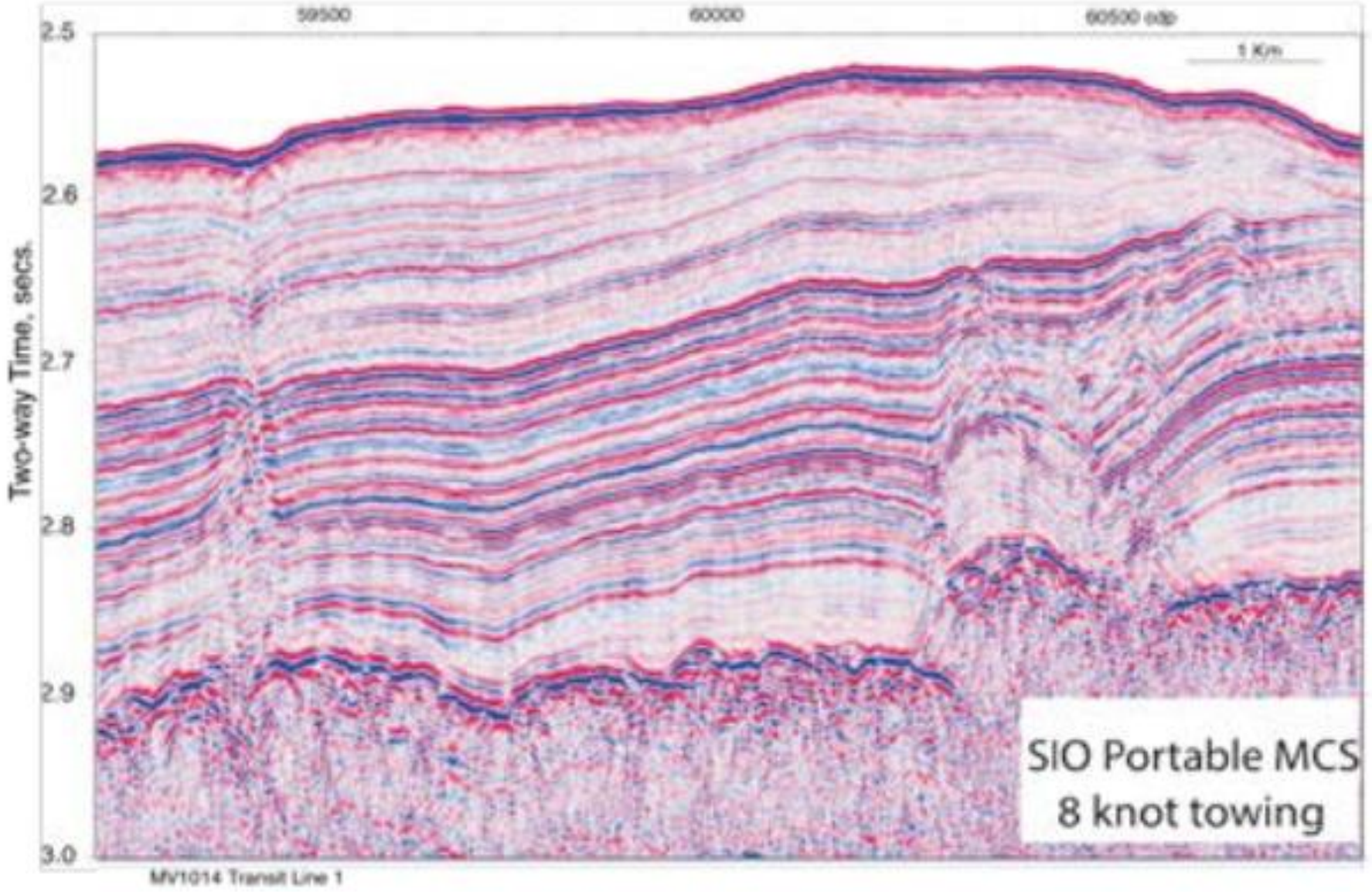
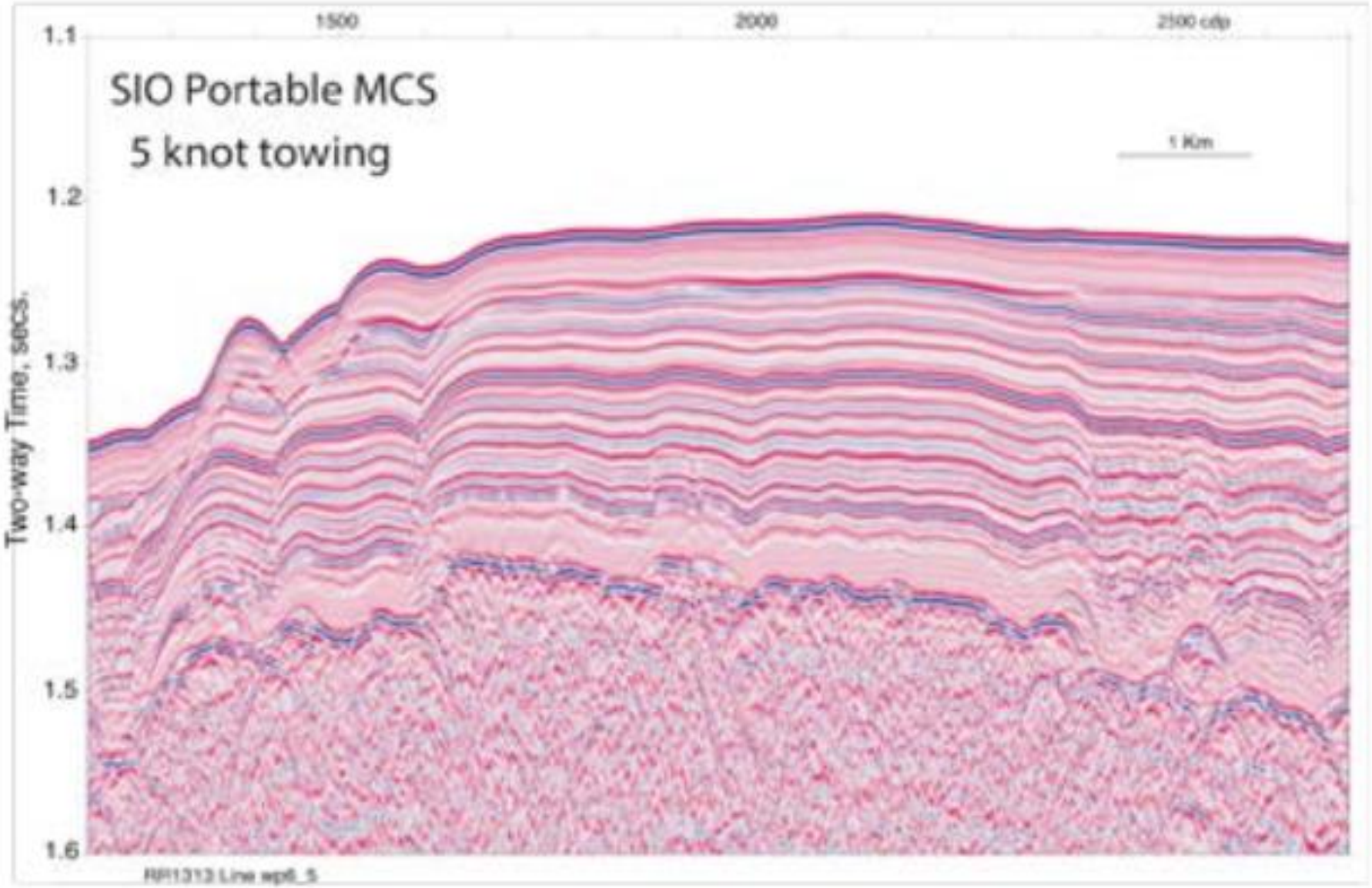


Fig. 2. (Upper) C2512 line 1 profile and (lower) interpreted tracing at the same scale; both are displayed in seconds of two-way travel time. The profile crosses DSDP Site 387 on the central western Bermuda Rise (location in Figure 1). The stratigraphic column at left (with standard DSDP lithologic symbols) is from Tucholke, Vogt et al., [1979] who noted the reflecting surface between A^c and A* that we have defined as Reflector A^b and have tied to an unconformity separating lower Paleocene from lower Eocene sediments.

AT40-03: IODP Site Survey



AT40-03: IODP Site Survey



MATRIX Cruise

Contributing to Mid-Atlantic Resource Imaging Experiment

- Gas hydrates + free Gas
- Fill in gaps in modern MCS data
- Provide data for non-hydrate CMGP goals

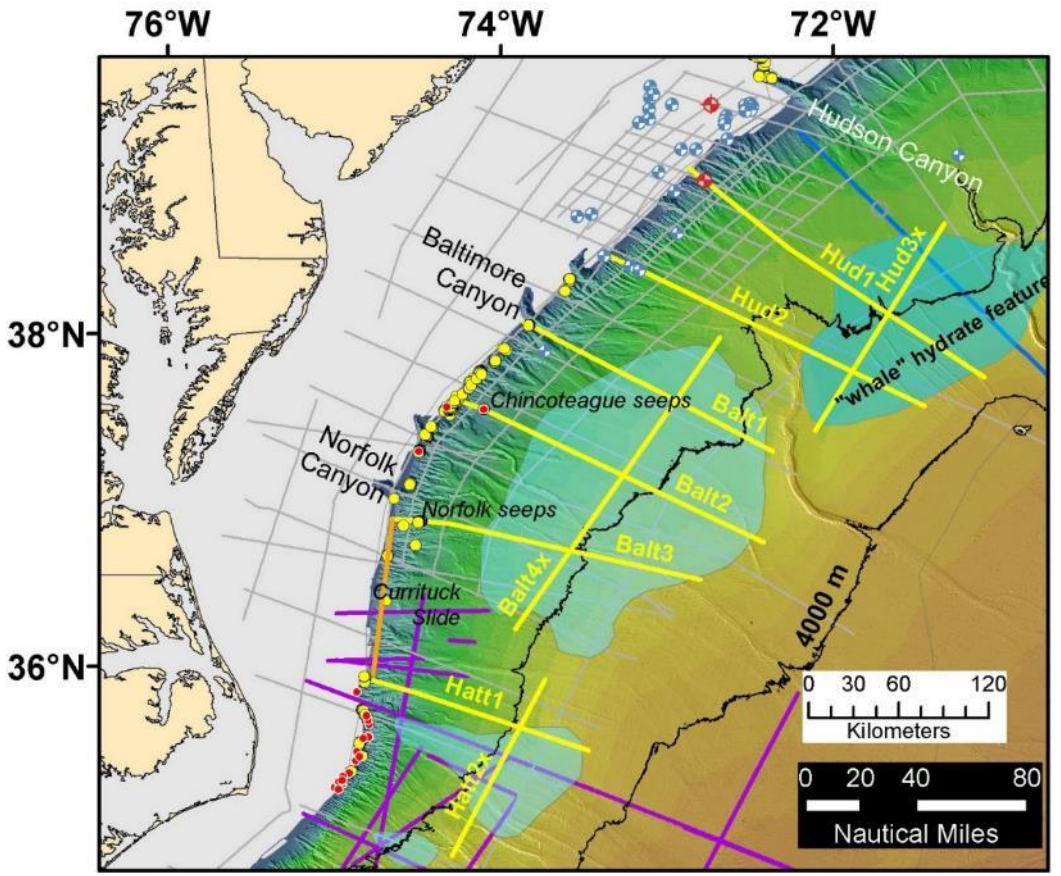
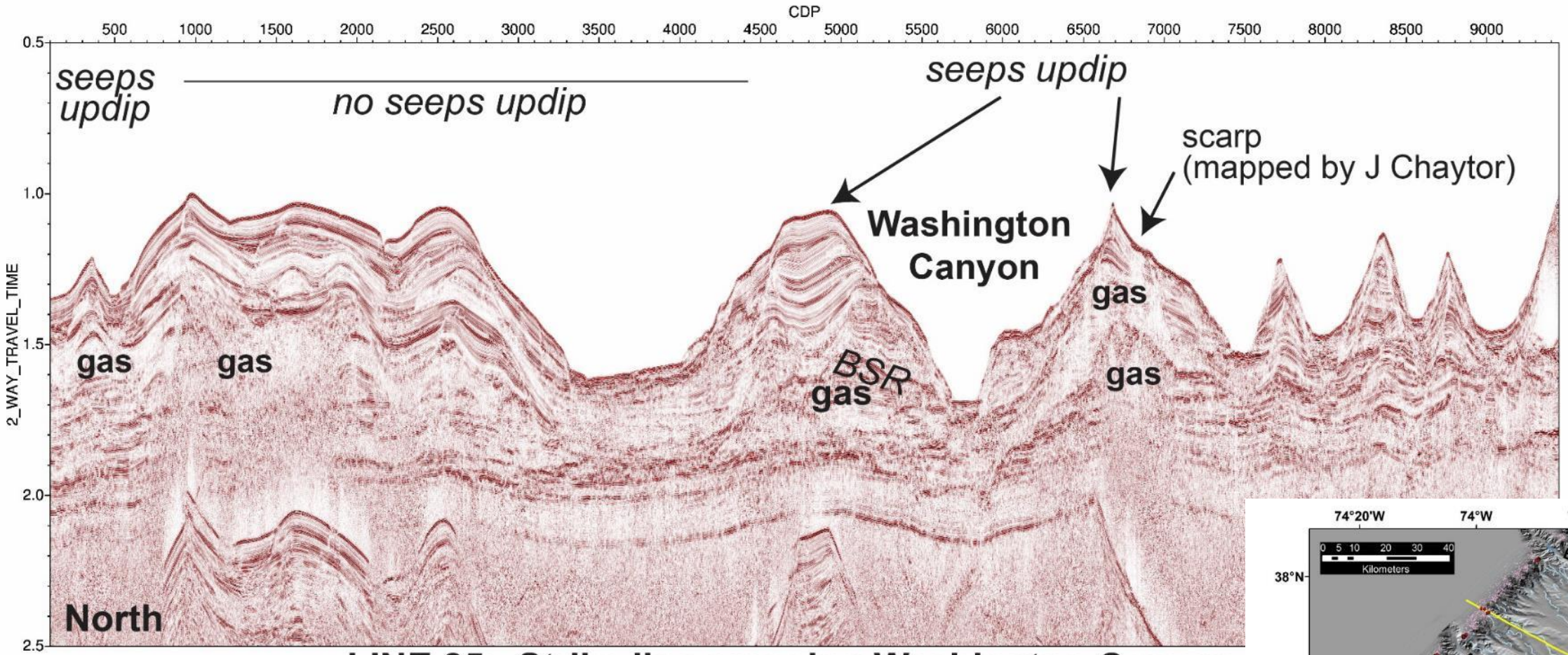
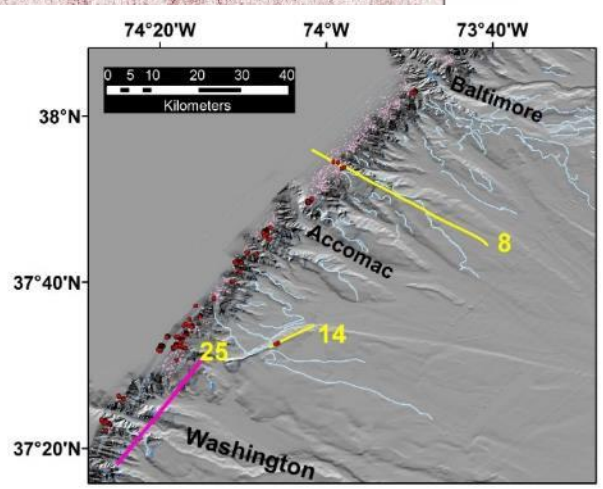


Figure provided by the USGS

MATRIX Cruise



LINE 25: Strike line crossing Washington Canyon



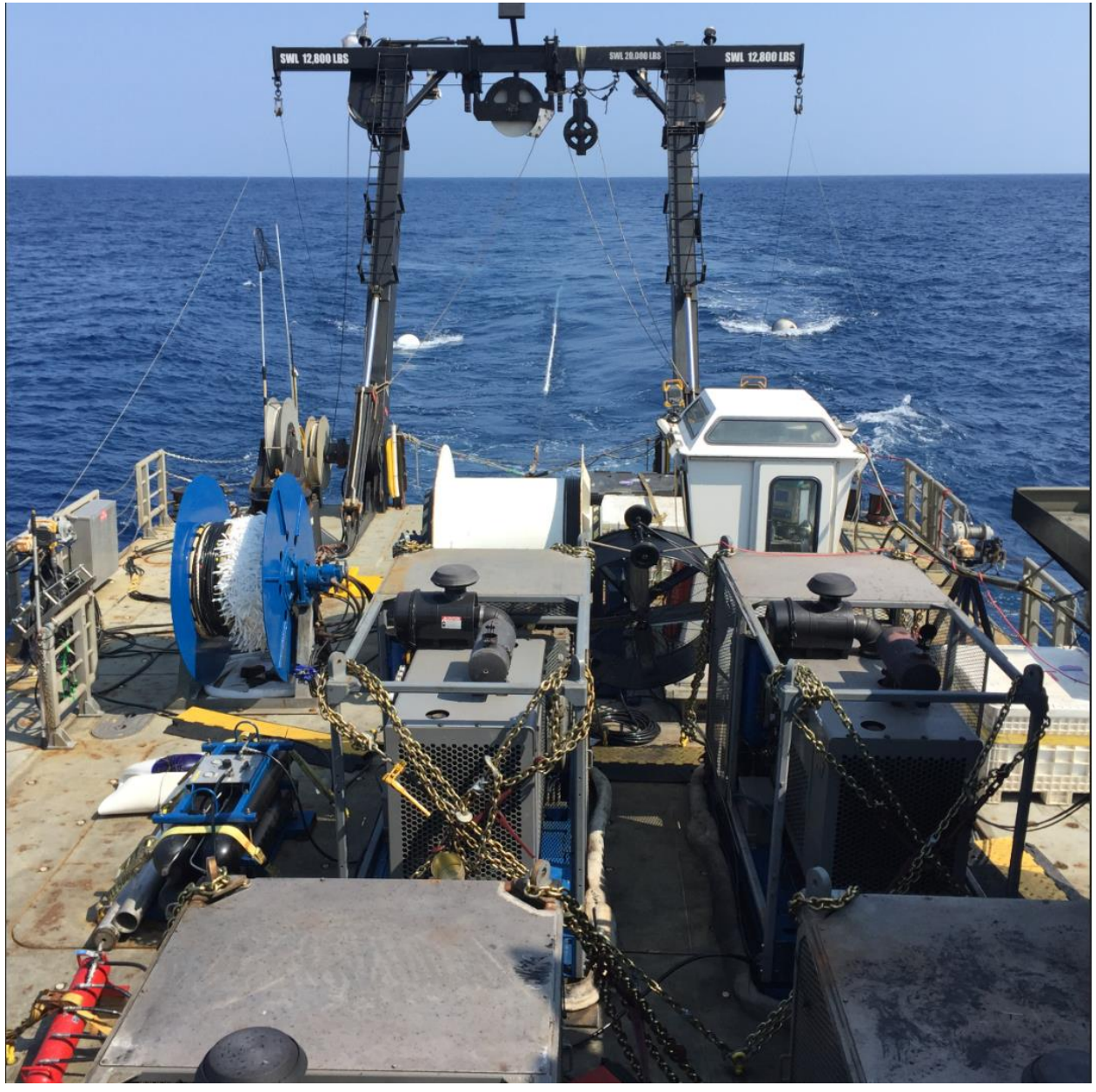
Figures provided by the USGS

MATRIX Cruise

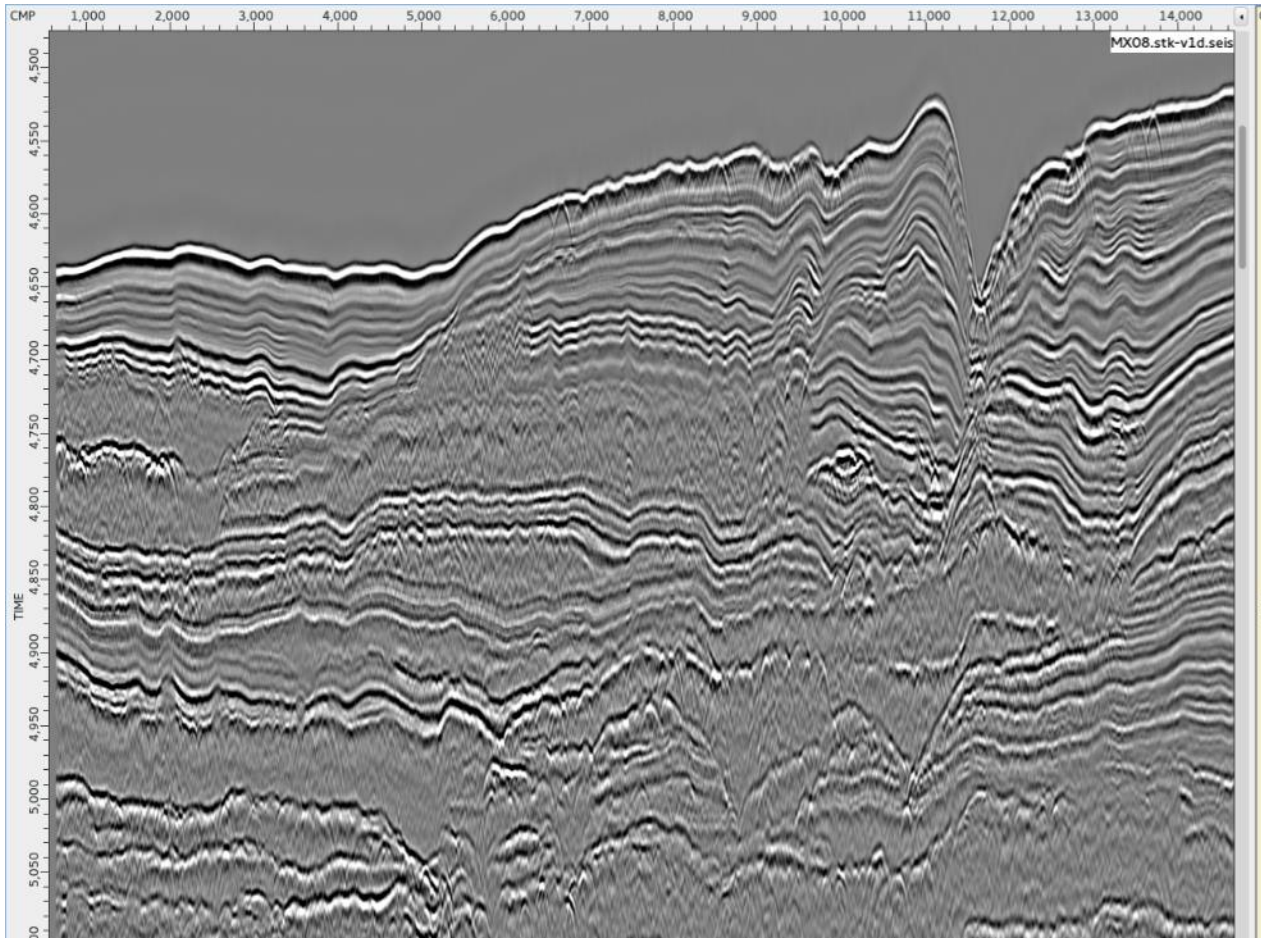
MATRIX Cruise

Scripps provided

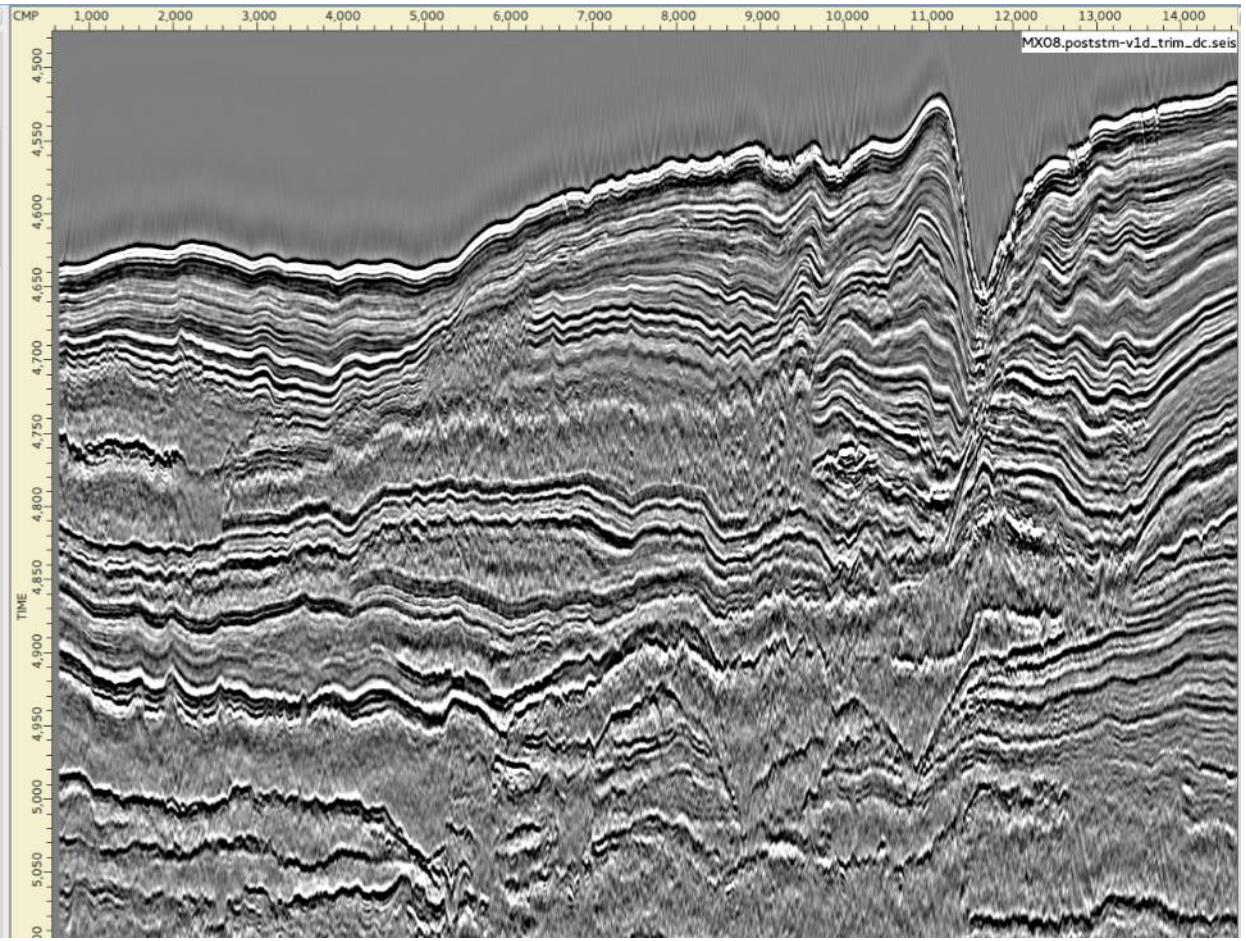
- 72 channels
- 2 streamer winches
- 2 gun winches
- 2 gun setup
- PSO equipment
- Kolby



MATRIX Cruise



Stack with 2D velocities



Post-stack migration and spiking deconvolution

Figure provided by Dr. Miller

MATRIX Cruise

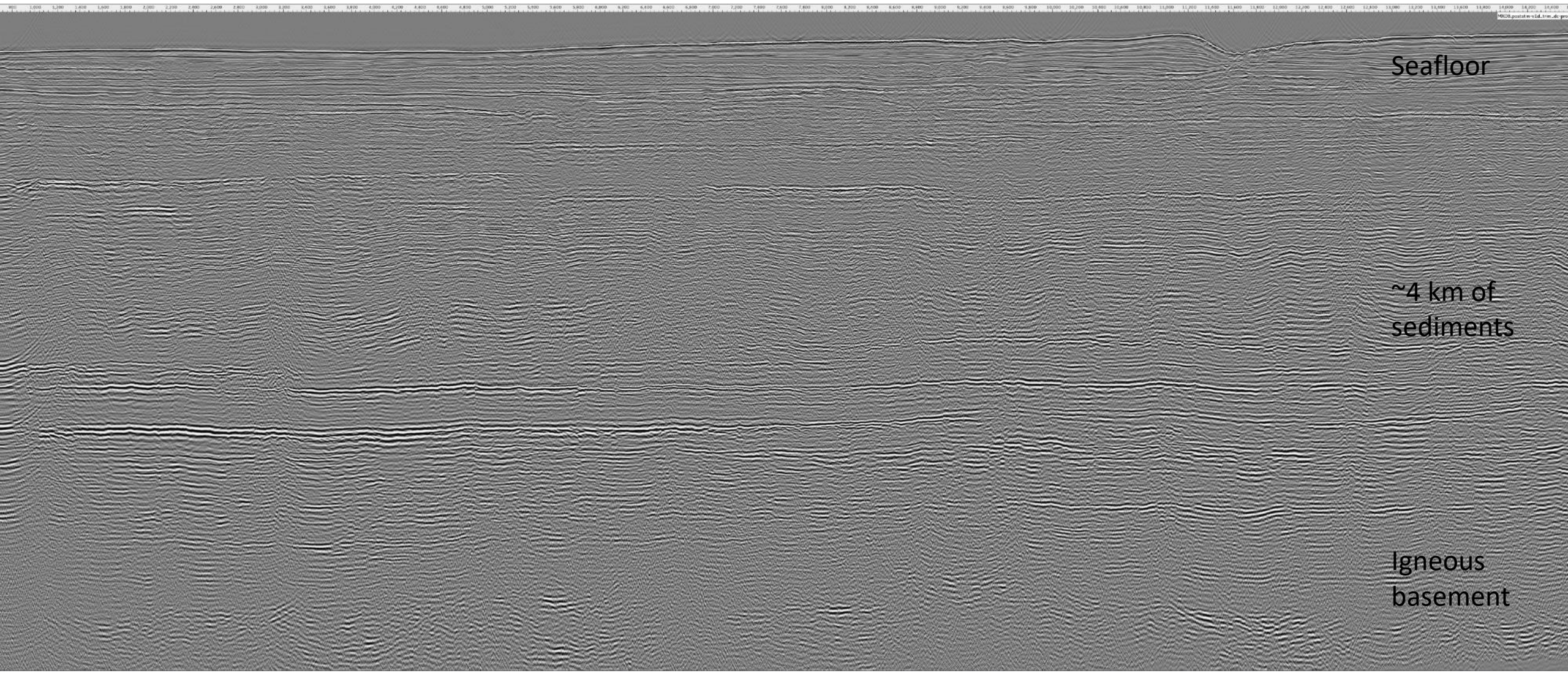


Figure provided by Dr. Miller

MATRIX Cruise

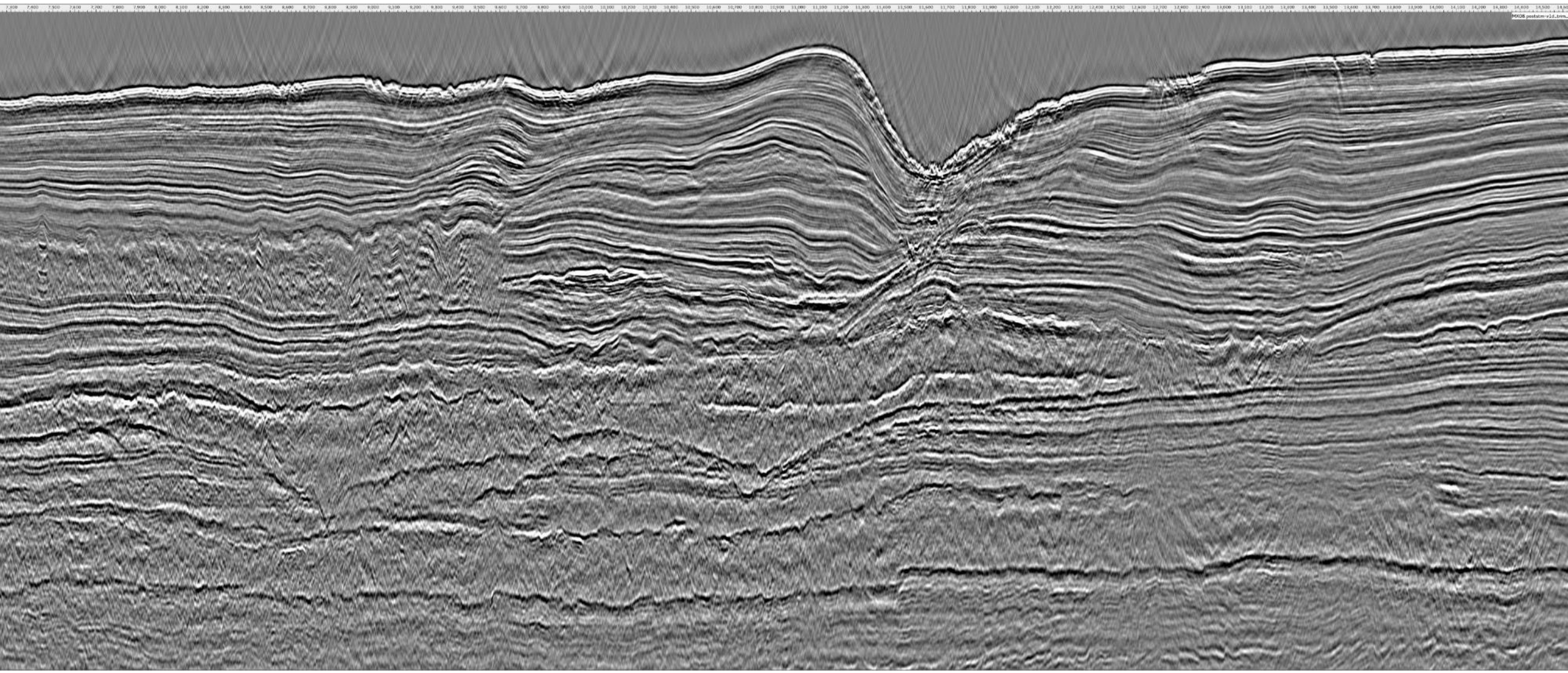


Figure Provided by Dr. Miller

Looking forward

88 days of portable high res MCS scheduled for next year

Looking forward

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Portable High Res MCS Wiki

- Environmental Permitting
- Equipment
- Vessel Requirements
- Crew
- Logistics
- Mobilization
- Acquisition
- Demobilization

Appendix

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Shipboard processing sequence:

Input and geometry:
- Read raw SEGD
- Assign 3D source, receiver geometry
- Assign midpoints to rectangular common-midpoint bins

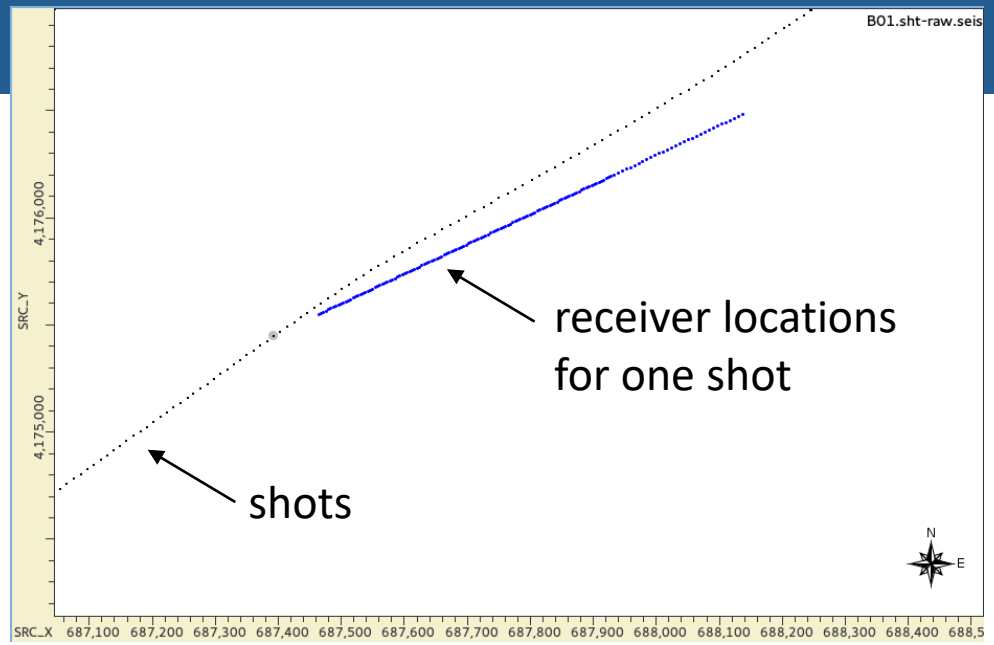
Noise suppression and gains:
- High pass filter at 20 Hz
- Despiking
- Spherical divergence correction
- F-x domain swell noise suppression
- F-x domain non-coherent noise suppression
- F-k domain ship and tail-buoy tug noise suppression

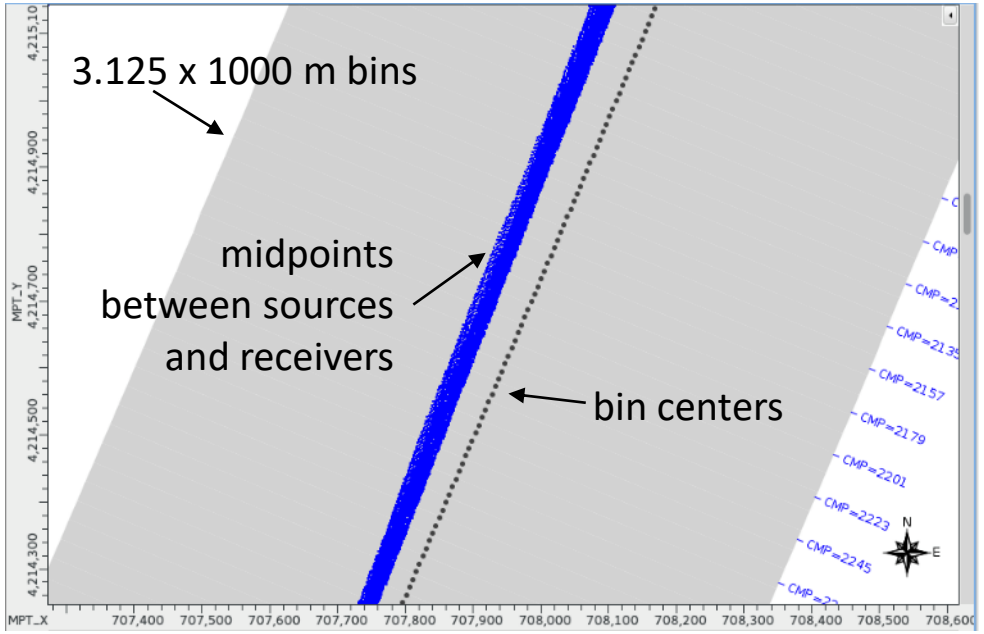
Velocity model:
- Pick seafloor
- Build 2D model by hanging 1D model from seafloor

Stacking and migration:
- Stack with 2D velocities
- Post-stack time migration
- Spiking deconvolution

Input and geometry:

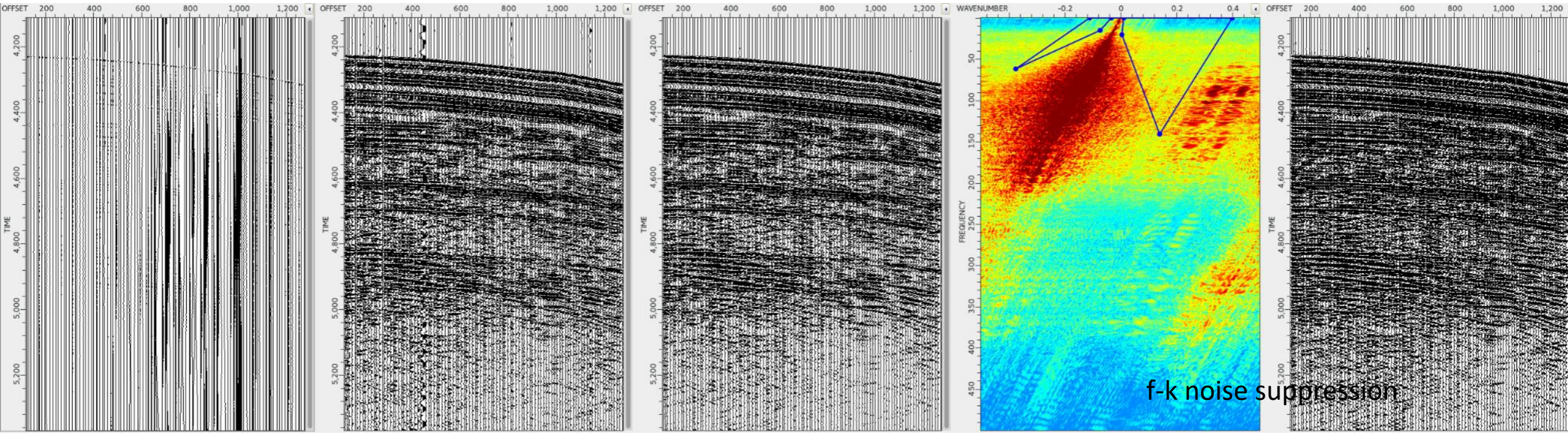
- Read raw SEGD
- Assign 3D source, receiver geometry
- Assign midpoints to rectangular common-midpoint bins





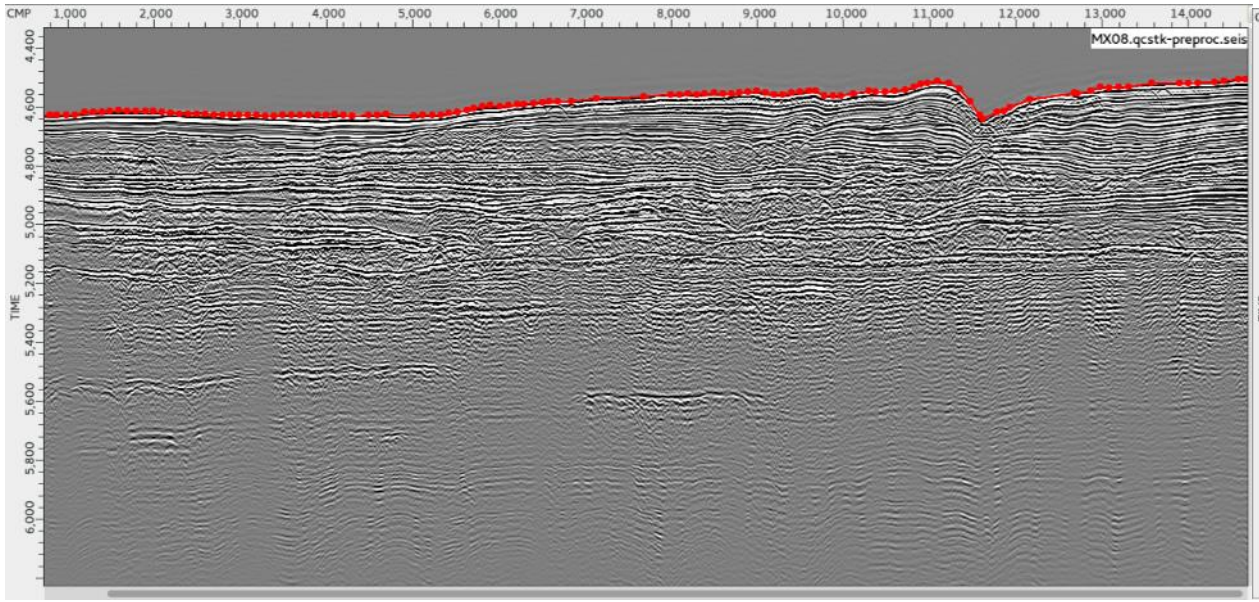
Noise suppression and gains:

- High pass filter at 20 Hz
- Despiking
- Spherical divergence correction
- F-x domain swell noise suppression
- F-x domain non-coherent noise suppression
- F-k domain ship and tail-buoy tug noise suppression

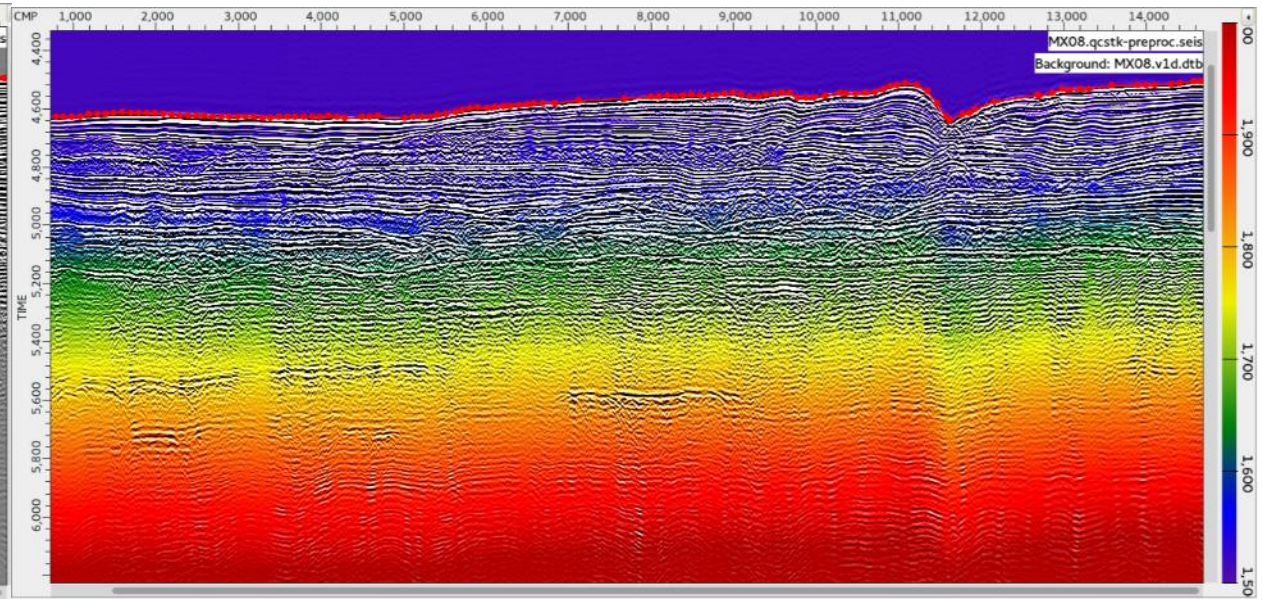


Velocity model:

- Pick seafloor
- Build 2D model by hanging 1D model from seafloor



Brute stack and seafloor picks



1D velocity model hung from seafloor

MODES	GENERATOR RESERVOIR		GENERATOR VOL. REDUCER		INJECTOR VOL. REDUCER		DISCHARGE PORTS	
	Volume	P/N	Volume	P/N	Volume	P/N	Type	P/N
HARMONIC 50*	45 cu.in	603_103	NONE		45 cu.in	603_045	MEDIUM	603_120
HARMONIC 90	45 cu.in	603_103	NONE		45 cu.in	603_045	MEDIUM	603_120
	105 cu.in	615_103	45 cu.in	615_045	45 cu.in	603_045	MEDIUM	603_120
HARMONIC 150	105 cu.in	615_103	75 cu.in	615_075	75 cu.in	603_075	MEDIUM	603_120
TRUE GI 150	45 cu.in	603_103	NONE		NONE		SMALL	603_119
	105 cu.in	615_103	45 cu.in	615_045	NONE		SMALL	603_119
HARMONIC 210	105 cu.in	615_103	NONE		NONE		MEDIUM	603_120
~~**HARMONIC 255**~~	~~150 cu.in~~	~~615_200~~	~~NONE~~		~~NONE~~		~~MEDIUM~~	~~603_120~~
~~**HARMONIC 355**~~	~~250 cu.in~~	~~615_300~~	~~NONE~~		~~NONE~~		~~MEDIUM~~	~~603_120~~