High Resolution Portable Multi Channel Seismic
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
Equipment

Digicourse Bird Streamer Level
Equipment

Acoustic Sources

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

Depth = 6m
Pressure = 2,000 psi

Figure provided by Sercel
Equipment

MCS Winches and HPU on the Atlantis
Equipment

Protected species mitigation
• Big eyes
• Night vision devices
• Reticule binoculars
Data acquisition systems

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

Photo: Rebecca Fowler
Early Career Scientist Cruise

Photo: Rebecca Fowler
Early Career Scientist Cruise

Figures provided by John Schmelz and Gregory Mountain (Rutgers University), and RR1718 Seismic ECS Cruise Participants
Early Career Scientist Cruise
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
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\textsuperscript{c} and A\textsuperscript{*} that we have defined as Reflector A\textsuperscript{b} and have tied to an unconformity separating lower Paleocene from lower Eocene sediments.
AT40-03: IODP Site Survey
AT40-03: IODP Site Survey

SIO Portable MCS
5 knot towing
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
Figures provided by the USGS
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

Seafloor

~4 km of sediments

Igneous basement
Looking forward

88 days of portable high res MCS scheduled for next year
Looking forward

Portable High Res MCS Wiki

- Environmental Permitting
- Equipment
- Vessel Requirements
- Crew
- Logistics
- Mobilization
- Acquisition
- Demobilization
Shipboard processing sequence:

Input and geometry:
- Read raw SEG
- 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
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<th>MODES</th>
<th>GENERATOR RESERVOIR</th>
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<th>INJECTOR VOL. REDUCER</th>
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