AGU FALL MEETING

OS21A-1961: Sea level history in 3D: Data acquisition and processing for an ultra-high resolution MCS survey across IODP Expedition 313 drillsite

ABSTRACT

Tuesday, 15 December 2015
08:00 - 12:20
Moscone South - Poster Hall

In June-July 2015, we acquired the first 3D/2D hybrid (short/long streamer) multichannel seismic (MCS) reflection dataset. These data were collected simultaneously across IODP Exp. 313 drillsites, off New Jersey, using *R/V Langseth*and cover ~95% of the planned 12x50 km box. Despite the large survey area, the lateral and vertical resolution for the 3D dataset is almost a magnitude of order higher than for data gathered for standard petroleum exploration. Such high-resolution was made possible by collection of common midpoint (CMP) lines whose combined length is ~3 times the Earth's circumference (~120,000 profile km) and a source rich in high-frequencies. We present details on the data acquisition, ongoing data analysis, and preliminary results. The science driving this project is presented by Mountain et al.

The 3D component of this innovative survey used an athwartship cross cable, extended laterally by 2 barovanes roughly 357.5 m apart and trailed by 24 50-m P-Cables spaced ~12.5 m with near-trace offset of 53 m. Each P-Cable had 8 single hydrophone groups spaced at 6.25 m for a total of 192 channels. Record length was 4 s and sample rate 0.5 ms, with no low cut and an 824 Hz high cut filter. We ran 77 sail lines spaced ~150 m. Receiver locations were determined using 2 GPS receivers mounted on floats and 2 compasses and depth sensors per streamer. Streamer depths varied from 2.1 to 3.7 m.

The 2D component used a single 3 km streamer, with 240 9-hydrophone groups spaced at 12.5 m, towed astern with near-trace offset of 229 m. The record length was 4 s and sample rate 0.5 ms, with low cut filter at 2 Hz and high cut at 412 Hz. Receiver locations were recorded using GPS at the head float and tail buoy, combined with 12 bird compasses spaced ~300 m. Nominal streamer depth was 4.5 m. The source for both systems was a 700 in^3 linear array of 4 Bolt air guns suspended at 4.5 m towing depth, 271.5 m behind the ship's stern. Shot spacing was 12.5 m.

Data analysis to prestack time migration is being carried out by Absolute Imaging, a commercial company. The shipboard QC analysis and brute stacks indicate that the final product will be superb. Key advantages of the hybrid 3D/2D dataset are: (1) Velocity control from the 2D long-streamer data combined with the ultra-high resolution of the P-Cable 3D dataset; (2) Opportunity for prestack and poststack attribute analysis.

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