Lomonosov Ridge, Arctic Ocean: New Data for Definition of Targets for Scientific Drilling

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BACKGROUND

The 1500 km long and 50-150 km wide Lomonosov Ridge rises more than 3000 m above the adjacent abyssal plains and divides the Arctic Ocean into a Mesozoic basin and a Cenozoic recent basin. Multi-channel seismic data collected from icebreakers on four cruises together with swath bathymetry and high resolution chirp sonar data collected by nuclear submarines from the central part of the ridge show a cap of hemipelagic drape (c. 450 m thick) on top of faulted and peneplained sedimentary sequences prograding towards the Canada Basin. ODP Proposal 533: paleoceanographic and tectonic evolution of the central Arctic Ocean focuses on obtaining the paleoceanographic information of the sediments in the Makarov basin.

DATA ACQUISITION

The seismic data was acquired from the Swedish icebreaker ODEN in late July 2001. The seismic source was 2 x 250 cuinch G-guns towed below a depressor at 0-7 m depth. The streamer had 200 m in length. The seismic data was acquired at an average speed of 2-3 knots. It is imperative that the towing cable enter the water as close to the vessel as possible to avoid having towed equipment being forced out of the water by blocks of ice.

PROCESSING

The data was processed as a crooked line geometry and CDP points were collected in 25 meter bins. The preliminary processing sequence includes: true amplitude recovery, sorting, stacking, deconvolution, trace mixing, bandpass filtering, muting and display. Lines 3 and 5 represents crosslines to the original line AWI 91091 at the location of the proposed sites.

CONCLUSIONS

- The ca. 450 m thick package of hemipelagic sediments (Mesozoic) on top of the ridge is laterally uniform (LORI-01);
- The sedimentary layers (Mesozoic) below the regional erosional unconformity are structured as several synclines and anticlines;
- The proposed location of Site LORI-01 is above a syncline in the sediments below the regional unconformity;
- The proposed location of Site LORI-03 is on the side of a complex mound and should be moved.

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