

Seismic exploration and sedimentation in Canada Basin, Western Arctic

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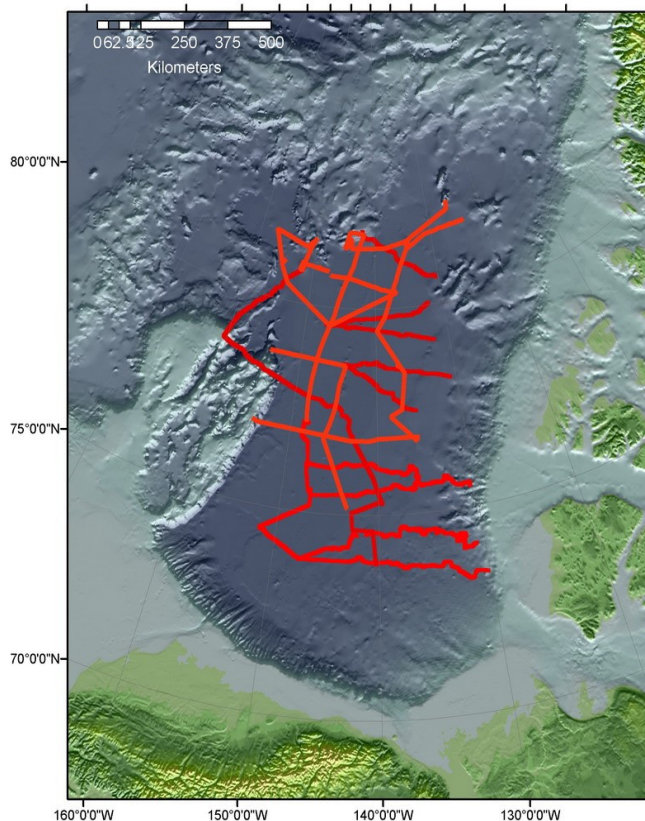
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Summary

Marine seismic field programs were undertaken in Canada Basin of the western Arctic Ocean during the past 3 years in order to study the geology and geomorphology of the region.



As part of this program, three icebreaker expeditions acquired bathymetric, seismic reflection and seismic refraction data on a regional scale. These expeditions have tripled previous data holdings in this ice-covered region, including large areas where no previous data existed, acquiring more than 9,866 line-km of multi-channel seismic reflection data and 82 sonobuoy seismic refraction records over abyssal plain and continental rise regions of Canada Basin, Northwind Ridge and Alpha Ridge. The success of these programs has been achieved through novel technical modifications to equipment to permit towing in heavy ice conditions and due to collaboration with US counterparts (e.g. USGS, UNH, NOAA) in order to utilize two ice breakers during seismic data acquisition in heavy ice.

The seafloor of the basin is remarkably flat-lying in its central region, extending for 100's of kilometres with little bathymetric change. The subsurface geology is generally flat lying with reflections correlating over long distances with negligible relief and onlap of bathymetric highs, such as the Alpha and Northwind ridges. Sediments reach 6.5 km in thickness in the deepest part of the basin. There is little evidence of tectonic deformation after primary basin-forming events and the few faults that are recognized appear to be related to consolidation effects. Although most survey data are distal to the Canadian continental slope along the western Arctic, there is evidence of submarine mass transport deposition extending well out on to the basin plain in the shallowest third of the sedimentary package. These characteristics suggest that sediment volume input to the Arctic Ocean has been high and dominated by turbidity current deposition, similar to Amundsen and Nansen Basins of the eastern Arctic. These turbidites may be sourced from the surrounding continental margins and ridges, originating as mass transport events along the margin.