

## **Extent of sedimentary basins and oceanic crust domain in the northern Labrador Sea**

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During 2006 Geophysical Service Incorporated (GSI) acquired two regional multi-channel seismic (MCS) reflection lines across the Labrador Sea at the approximate latitude of the northern Saglek Basin, on the Labrador shelf (Canada) and Lady Franklin Basin on the Greenland shelf (Denmark). More precisely, the two NE-SW trending lines run between 59° and 63° North Latitude and 51° to 63° West Longitude and are each approximately 750 km long. These 12 second, 7200 m streamer recorded data are critical for estimating the distribution of sedimentary fill into the deepwater, deciphering the nature of the basement beneath the sedimentary cover of the continental shelf, slope and rise, and evaluating the petroleum potential of the area beyond the customary explored shelf.

They also help to clarify the evolution of the Labrador Sea and its sedimentary basins through the following stages:

- 1) Mesozoic intra-cratonic extension (intercontinental rifting);
- 2) Mantle exhumation and transitional crust formation;
- 3) Cenozoic oceanic crust creation (oceanic rifting) and
- 4) Cessation of oceanic rifting (drifting) with associated prominent regional thermal subsidence.

The lines are complementary to earlier MCS research and industry data in the area and offer vital information in determining: a) if any true oceanic crust was emplaced between the northern Labrador and Greenland shelves; b) the location, timing, extent and modality of such emplacement; and c) if a continuous mid-ocean spreading ridge was active in the area. These lines will also provide fundamental geoscientific data in support of Canada's ongoing United Nations Convention on the Law of the Sea (UNCLOS) negotiations regarding the delineation of maritime jurisdictional boundaries in the Labrador Sea.

Of particular interest is that the regional seismic profiles show the presence of thick Mesozoic and probably older sedimentary basins with potential hydrocarbon resources, way beyond the shelf, in currently drillable water depths (1 to 3km). On these seismic lines, the Labrador Sea appears to

be an asymmetric successful rift containing about 10 km thick Mesozoic and Tertiary sedimentary sequences on the Canadian margin and a much shallower, only several kilometer thick, sedimentary cover on the Greenland margin.

On the Labrador side, the Saglek Basin shows a large, slightly disturbed shelf and a much more tectonised slope and upper rise. The basin considerably extends into the deepwater where it makes contact with the transitional crust. At the latitude of the survey, the opposite margin containing parts of the Lady Franklin Basin consists of a narrow shelf and shows stair-like basement geometry with sedimentary sequences filling small half-grabens.

The oceanic crust domain is narrow and unlike in the previous published interpretations and maps, is located toward the Greenland side. The existence and position of the oceanic crust domain is substantiated by both reflection and potential field data. While magnetic data shows an oceanic spreading ridge, no central graben in its axis and no crustal symmetry are observed on these trans-Labrador Sea multi-channel reflection data.

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