

## **Tectonic and Stratigraphic Insights in the Development of NE Greenland Margin through Deep, Long Offset, Prestack Depth Migrated (PSDM), 2-D Seismic Data**

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In 2009, ION Geophysical acquired 5,283km of “Deep Tow Long Offset” 2D seismic data as part of a larger survey designed to cover the NE Greenland Shelf. The NE Greenland Shelf is 1,200 km long and 200-600 km wide and is considered to be the conjugate margin to the northwest Norwegian shelf. Hence, this area is considered a key region for potential petroleum resources (31.4 Billion Barrels of oil equivalent; US Geological Survey, 2007) as well as for understanding the evolution of rift margins and the opening history of Northeast Atlantic Ocean.

Severe environmental constraints have resulted in previously available seismic data not adequately imaging the margin. In order to overcome some of these operational difficulties, we used a proprietary streamer and deployment technology under pack ice. The method involves a leading ice-breaking ship clearing for the primary acquisition vessel. Not having to steer around first-year ice, this method allows the seismic program to remain focused on geologic targets to be imaged.

Our data currently extends between 72 and 77 degrees north, between the Jan Mayen Fracture Zone in the south to the Greenland Fracture Zone in the north, covering the southern part of South Danmarkshavn Basin, Thetis Basin, and the Northeast Greenland Volcanic Province. We have interpreted this data in amplitude displays as well as in “average energy” displays, which allows better definition of deep reflectors by combining the energy across a wider zone than the typical sampling interval in the data (2ms). The interpretations have been tested iteratively against gravity and magnetic modeling. The data show a very thick (>10 km) sedimentary sequence in the southern part of the Danmarkshavn and Thetis Basins. Several of the dip lines cross the ocean-continent transition and clearly show a Moho reflector at ~10 km depth under oceanic crust deepening to more “continental” depths (>20 km) under the shelf. The definition of sedimentary sequences under the volcanic province to the south is problematic but some indications of sub-basalt stratigraphy can be seen in our data. These observations enforce the perception of the region’s excellent petroleum potential by suggesting that reservoir and source rocks, as well as traps and seals are present in the area.