

# **The Structural and Stratigraphic Development of the NE Greenland Margin Interpreted From New Deep, Long-offset Seismic Data**

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Deep long-offset seismic surveys have been acquired from 2009-2011 on the NE Greenland Shelf from north of the Jan Mayen Fracture Zone to the northern part of the shelf edge. This new data includes an area that previously had little or no seismic coverage in the northern part of the Danmarkshavn Basin and the area east of the Wandel Sea Mobile Belt. Details are emerging of a margin with a long structural history that includes multiple phases of rifting, a major strike-slip plate boundary in the north, and final development of the passive divergent margin that we see today. It has added significantly to our knowledge of the structural and stratigraphic development of the region and will have an important impact on the general understanding of the Mesozoic – Cenozoic development of the intra-continental strike-slip margin between NE Greenland and Eurasia.

The Danmarkshavn Basin is a large, very deep sedimentary basin characterized by Permo-Carboniferous salt tectonics in the central and northern parts. Numerous unconformities along the basin margins indicate repeated tectonic activity throughout the basin history. Some salt intrusions have penetrated nearly to the seafloor and collapsed due to salt withdrawal is interpreted, showing that the salt movement was active from the Jurassic.

The survey has led to the identification of a new Palaeogene basin on the NE margin of the shelf, informally referred to here as the “Westwind Basin” after a seabed topographic feature in the area. This basin has been affected by strike-slip motion as the Greenland plate moved NW relative to the Barents Shelf in the Palaeogene, which is consistent with a new plate tectonic reconstruction of the Fram Strait region that show that the relative plate motion between Greenland and Eurasia changed from right-lateral shear to oblique divergence in the earliest Oligocene, resulting in the extensional faulting that can be clearly seen on the seismic data.

The NE Greenland Shelf is the conjugate margin to the Lofoten and Vøring Margins of Mid-Norway and it lay south of the Barents Shelf prior to break up. Several of the seismic lines extend across the Continent Ocean Transition (COT) on the eastern margin of the NE Greenland Shelf where a high-amplitude deep crustal event is seen at ~15 km along the outer margin. This event is related to a Lower Crustal Body (LCB) comparable to the one previously described on the conjugate Vøring Basin margin. The observed presence of this LCB continuing north of the Greenland Fracture Zone has important implications on the structural development of the margin. The revised structural and stratigraphic interpretation for the development of the region has now been used to develop a new deformable plate reconstruction model for the area, which is key to the interpretation of revised palaeogeographies and the prediction of potential source and reservoir deposits and their relationship to the Norwegian margin.