



## **Mapping faults and intrusions onshore Disko Island by use of Vibroseismic data, shallow marine seismic data and electromagnetic observations**

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The west Greenland margin is characterized by sedimentary basins containing high density of intrusions (dikes and sills) originating from the Cenozoic breakup and separation of Greenland and North American.

The magmatic rocks have lately attracted interest due to observations of hydrocarbons associated to the intrusions but here due to the ore potential associated to the same intrusions. In 2000 a marine seismic campaign by GEUS in the coastal areas of West Greenland showed that it is possible to identify magmatic intrusions in the sedimentary succession as well as map normal faults, and that the intrusions are heterogeneous distributed and probably related to the normal faults. The presence of normal faults is known from the regional onshore geological mapping campaigns performed by GEUS. However, the marine seismic data indicate a much more complicated structural pattern than presented in the onshore maps, which is a well-known phenomenon (Marcussen et al., 2002).

In 2012 and 2013 seismic data were acquired onshore on the northern coast of Disko as part of a research project funded by Avannaa Resources. The objective was initially to test whether it is possible to acquire data of a quality enabling the observation and mapping of intrusions in the subsurface. Later it was followed by a more extensive survey where it was attempted to map the depth to and geometry of the intrusions.

The relatively dense seismic grid onshore -compared to the marine seismic data offshore west Greenland- enable the identification and more important the mapping of several intrusions. They show some of the same characteristics as intrusions observed at e.g. the Norwegian margin of the North Atlantic (Hansen et al., 2004).

The preliminary results which integrate both marine and onshore seismic data revise the structural understanding of the area and indicate a close relation between the intrusions and the rift related normal faults. The results are consistent with remote sensing methods (e.g. ZTEM data) and is of major importance for understanding the structural evolution of the continental breakup

Hansen, D. M., J. A. Cartwright and D. Thomas (2004). "3D Seismic Analysis of the Geometry of Igneous Sills and Sill Junction Relationships." Geological Society Memoir 29: 199-208.

Marcussen, C., Skaarup, N., Chalmers, J.A., 2002. Structure and hydrocarbon potential of the Nuussuaq Basin: acquisition and interpretation of high resolution multichannel seismic data ENS J nr. 1313/99-0024, Danmark og Grønlands Geologiske Undersøgelse Rapport 2002. GEUS, p. 63