



The multifaceted West Greenland passive margin

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The Baffin Bay located between Greenland and Canada, is the northward extension of the Labrador Sea. The Davis Strait High separates these two marine basins. The evolution of these basins is closely linked, and is as well affiliated to the opening of the North Atlantic Ocean. The opening history started in the Cretaceous with the formation of several terrestrial rift basins with a block-faulted, metamorphic Precambrian basement. The further opening of the Baffin Bay coincides with the volcanic activity (60.9-52.5 Ma) along the West Greenland margin (Storey et al., 1998). The subsequent seafloor spreading in the Baffin Bay is linked to the Labrador Sea by the Ungava Fault Zone (UFZ), which is the most prominent transform fault in this region. Two main problems are still unsolved: 1) There are clear indications for normal seafloor spreading in the Baffin Bay like the seaward dipping reflectors (SDRs) on the Canadian side (Skaarup et al., 2006) and on the Greenland side based on our data. On the other hand, associated magnetic spreading anomalies are not yet discovered in the Baffin Bay or are not formed. These findings may either point to slow or ultraslow spreading or underlying strongly extended continental crust and/or serpentinised mantle. 2) The Greenlandic margin is much wider than the Canadian. In addition, a breakup unconformity can only be traced on the Greenland side and is not reported for the Canadian side. Which process causes this asymmetric margin and differences in shelf width? Is it a result of asymmetric spreading or connected to volcanic activity during breakup processes?

In summer 2008, a marine geoscientific expedition (MSM09/03) was conducted with the research vessel "Maria S. Merian" in the Davis Strait and southern Baffin Bay. Approximately 1800 km of multichannel reflection seismic data were acquired. To supplement the database, a subsequent marine geoscientific expedition ARK-XXV/3 with RV POLARSTERN in summer 2010 was conducted.

In our presentation we demonstrate the various structural characteristics of the Greenland margin based on new geophysical and potential field data acquired along profiles in the West Baffin Bay. Based on the new processed seismic reflection data the Davis Strait area can be characterised as a typical passive continental margin structure with its large rotated basement blocks and with its pronounced basement highs separating the internal basins. Further north, in the southern Baffin Bay the geological setting changes. Here, the new discovered SDRs on the Greenland side point to a volcanic passive margin. In the reconstruction of the Baffin Bay, (Oakey and Chalmers, 2012) show corresponding SDRs on the Canadian side, which build the conjugated margin to ours. The extinct spreading centre can be distinguished and changes from normal to slow or ultra-slow spreading can be documented from the seismic data.

Oakey, G.N. and Chalmers, J.A., 2012. A new model for the Paleogene motion of Greenland relative to North America: Plate reconstructions of the Davis Strait and Nares Strait regions between Canada and Greenland. *J. Geophys. Res.*, 117(B10): B10401.

Skaarup, N., Jackson, H.R. and Oakey, G., 2006. Margin segmentation of Baffin Bay/Davis Strait, eastern Canada based on seismic reflection and potential field data. *Marine and Petroleum Geology*, 23(1): 127-144.

Storey, M., Duncan, R.A., Pedersen, A.K., Larsen, L.M. and Larsen, H.C., 1998. $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of the West Greenland Tertiary volcanic province. *Earth and Planetary Science Letters*, 160(3-4): 569-586.