Structure and Development of the Conjugate mid-Norway - NE Greenland Margins

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The continental margins off mid-Norway and NE Greenland share a common geological history leading up to breakup in earliest Eocene. The geology offshore NE Greenland is poorly understood due to a limited geophysical database, however recent acquisition of 100,000 km of aeromagnetic and aerogravity data and 2,800 km of new 2D seismic data provide important insight into the basin geometry, volcanic structure and post-breakup development of the conjugate margins.

Geophysical data reveal that the continental domains, continent-ocean transitions, and volcanic deposits exhibit large asymmetry and structural variations across the margins. For example, the km-thick wedges of flood basalt (SDRs) and mixed sequences of volcaniclastic and massive basalt deposits (Landward Flows, Lava Delta, and Inner Flows facies units) observed in seismic data on the Vøring margin are currently not identified in seismic data on the conjugate part of the NE Greenland margin. Nor are the sedimentary ridges and basins observed in potential field and seismic data on the outer Vøring margin. The large basement ridges and deep sedimentary basins in the Danmarkshavn segment of the northeast Greenland margin show a similar inherited structure as the Lofoten margin. Deep Cretaceous basins observed on the outer Vøring margin are similarly observed in the northern part of the northeast Greenland margin. Whereas post-breakup development on the Mid-Norway margin was dominated by thermal subsidence, slow sedimentation, and compression documented by inverted sedimentary basins and large Tertiary domes, development offshore NE Greenland is characterized by thermal subsidence, uplift, erosion, and salt tectonics. Potential field data suggests that the deep Mesozoic basins may continue west beneath the Vøring Marginal High and south beneath the flood basalts in the NE Greenland volcanic province, however the sub-basalt areas on both margins is presently poorly imaged in seismic data.

We present geophysical examples that highlight the important differences of the conjugate margins and their implications for a petroleum system on the NE Greenland margin. In summary, the data reveal strong margin asymmetry and both similarities and differences in potential petroleum systems. Whereas drilling has proven a petroleum system on the outer Vøring margin, current support for an active petroleum system offshore NE Greenland is dependent on a better understanding of the post-breakup development of the margin.