



Basin evolution at the SW Barents Sea margin and its conjugate off NE Greenland

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The SW Barents Sea margin developed from a megashear zone which linked the Norwegian-Greenland Sea and the Arctic Eurasia Basin during the initial Eocene opening. Within the dextral megashear system, a series of deep and narrow basins formed in the SW Barents Sea. These basins formed in response to multiple rift events and rapid differential subsidence.

The distribution of salt structures both in the SW Barents Sea and on the conjugate NE Greenland margin reflects the Late Paleozoic basin configuration. Late Middle Jurassic to Early Cretaceous rifting affected all deep basins in the SW Barents Sea (e.g., Bjørnøya, Tromsø, Harstad and Sørvestsnaget basins) as on the mid-Norwegian margin and the conjugate NE Greenland margin. Following rifting, a wide region subsided and was covered by thick Cretaceous strata.

Late Cretaceous-Paleocene rifting between Norway and Greenland was taken up within the megashear zone and pull-apart basins formed in the SW Barents Sea and in the Wandel Sea Basin in NE Greenland. Contraction/inversion formed structural highs separating distinct Late Cretaceous depocenters that continued to subside rapidly. The rifting culminated in crustal breakup and accretion of oceanic crust near the Paleocene-Eocene transition. NE Atlantic breakup was accompanied by large-scale igneous activity, which also affected parts of the SW Barents Sea margin.

The sheared Senja FZ margin is segmented, each segment having different structural styles reflecting a complex interplay between the geometry of the sheared margin segments and the opening direction. A continental sliver was also cut off the SW Barents Sea margin, now forming the Greenland Ridge which is a protrusion of the NE Greenland margin. The continent-ocean transition is confined within a narrow zone, bounded by a characteristic marginal high along the Senja Fracture Zone.

During Eocene, the Harstad and southern Sørvestsnaget basins developed as narrow, elongated, en echelon basins landward of the marginal high. The northern Sørvestsnaget Basin and Vestbakken Volcanic Province formed in a pull-apart setting related to a releasing bend in the margin. These sedimentary basins subsided rapidly and received large amount of erosional products from the uplifted Barents Shelf, in particular the Stappen High in the north (surrounding Bjørnøya).

Several of the marginal basins experienced reactivation by contraction/inversion, and finally they were buried by a thick westward prograding wedge of Plio-Pleistocene glacial sediments derived from the uplifted Barents Shelf.