

Paper Number: 4303

Basin architecture and evolution at NE Atlantic conjugate margins

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The sedimentary basins at the conjugate margins off mid-Norway, NE Greenland and in the SW Barents Sea formed in response to multiple phases of post-Caledonian rifting from Late Paleozoic time to final NE Atlantic crustal breakup at the Paleocene-Eocene transition. The >200 million years of repeated extension caused comprehensive crustal thinning and formation of deep sedimentary basins. The late Mesozoic-early Cenozoic rifting was related to the northward propagation of North Atlantic sea floor spreading, but also linked to important tectonic events in the Arctic. Prior to that, Late Paleozoic rift basins formed between Norway and Greenland and in the western Barents Sea. 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 Jurassic-Early Cretaceous rifting was the dominant, composite tectonic episode which gave rise to prominent NE-trending structures in the NE Atlantic. Following rifting, a wide region subsided and was covered by thick Cretaceous strata. Aptian-?Albian rifting is documented locally off mid-Norway, onshore East Greenland and in the SW Barents Sea.

A distinct Late Cretaceous rift event is documented on the conjugate mid-Norway and East Greenland continental margins, and is characterised by large-scale normal faulting and locally by low-angle detachment faulting within thick Cretaceous strata. The Late Cretaceous rifting between Norway and Greenland was taken up within the De Geer megashear zone and pull-apart basins formed in the SW Barents Sea and in the Wandel Sea Basin in NE Greenland.

The rifting culminated in crustal breakup and accretion of oceanic crust near the Paleocene-Eocene transition, accompanied by large-scale igneous activity associated with the North Atlantic Large Igneous Province. The line of breakup was located oblique/diagonal across the pre-existing rift system. Passive rifted margins developed off mid-Norway and central East Greenland, while predominantly sheared margins developed along the western Barents Sea-Svalbard margin and its conjugate off NE Greenland, linking sea floor spreading in the Norwegian-Greenland Sea and the Arctic Eurasia Basin.

Following breakup, the subsiding margins experienced modest sedimentation until the late Pliocene when large wedges of glacial sediments prograded into the deep ocean from uplifted areas along the continental margins. The outbuilding was probably initiated in Miocene time indicating pre-glacial

tectonic uplift of Greenland, Fennoscandia and the Barents Shelf. The NE Atlantic margins also reveal evidence of Cenozoic compressional deformation.

The basin architecture and evolution will be discussed in relation to the regional tectonic setting and changing stress regimes, the role of structural inheritance, the amount and distribution of crustal thinning, the migration and orientation of depocenters, the distribution and role of magmatism during breakup, and the vertical motion history.

