Basin evolution at the Norwegian-Northeast Greenland conjugate margins in the NE Atlantic

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Late Mesozoic-Cenozoic tectono-stratigraphic correlations between the conjugate Norwegian-Barents Sea and NE Greenland continental margins are provided based on detailed studies during the last years refining the structural and stratigraphic framework off mid-Norway, on updated early opening plate reconstructions, and on recent multichannel seismic profiles. Constraints on the conjugate crustal structure, magmatism and breakup derive from compilation of earlier OBS surveys and wide-angle seismic velocity profiles, as well as from updated crustal-scale 2D gravity modeling. A series of conjugate regional transects have been constructed and reveal important vertical and lateral variations in crustal architecture as well as basin configuration and stratigraphy resulting from a complex history of rifting prior to and during the last rift episode in Late Cretaceous-Early Cenozoic time, leading to breakup and volcanic passive margin formation. Locally thick Upper Paleozoic-lower Mesozoic sequences are recognized (dominantly offshore NE Greenland) that together with interpreted Middle-Upper Jurassic-lowermost Cretaceous sequences define petroleum system play models similar to the well-established ones offshore mid-Norway and Barents Sea. Although the composite late Middle Jurassic-earliest Cretaceous rifting is the dominant tectonic episode, we also observe structural and stratigraphic relations that indicate two additional rift phases with obvious petroleum play system implications: an Aptian-?Albian rift phase, probably coeval with similar events elsewhere on the NE Atlantic margins; and Late Cretaceous rifting, with onset in middle Campanian time, that is characterised by low-angle detachment faulting, culminating with regional uplift, intrusive igneous activity and subsequent erosion towards the end of the Paleocene. The Late Cretaceous rifting between Norway and Greenland was taken up within the De Geer Zone by down-faulting in a pull-apart setting. Thick seaward dipping reflector sequences manifest massive eruptions of lavas during breakup at the Paleocene-Eocene transition. The post-breakup passive margin development is characterised by the transport and deposition of large amounts of sediments in response to margin subsidence and continental uplift, particularly during two distinct phases of outbuilding in Oligocene?/Middle Miocene and Plio-Pleistocene times, which may have affected considerably the underlying petroleum system. Of special interest are a number of mid-Cenozoic intra-basin inversion features recognised both off Norway and off Greenland, revealing a regional compressive regime.

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