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Distribution, structure and seismic stratigraphy of syn-breakup and post-breakup sediments in the Faroe sector of the Faroe-Shetland Basin, NE Atlantic- an interplay between localized uplift, deposition and subsidence

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Emplacement of the Cenozoic deposits in the Faroese sector of the Faroe-Shetland Basin, NE Atlantic volcanic margin, during late pre-, syn- and post-breakup are controlled by decelerating thermal subsidence of the basin, local uplift of source areas and reactivation of older structural elements that control the pathway. The findings are based on interpretation of all reflection seismic data available in the Faroese sector supplemented by 13 exploration wells.

In the period immediately before breakup, in Late Palaeocene, lava originating from NW entered the marine central part of the basin thus developing hyaloclastites at the same time as siliciclastic deltaic deposition took place from the SE.

During syn-breakup in Early Eocene, subaerial volcanic material entered the basin from N-NW while sediment bodies of the siliciclastic origin prograde out from the British Shelf filling the accommodation space in the central part of the basin. The volcanic material covered almost the entire pre-breakup volcanic succession apart in the Corona Sub-basin and the Faroe-Shetland Escarpment area where the uppermost volcanic material is of pre-breakup age. It is concluded that in the central part of the Faroe-Shetland Basin the effect of the breakup only lasted for approximately 1 Ma years, although the areas closer to the breakup area may have been affected for a longer period.

Through post-breakup in Eocene time the depocentre was placed in the central part of the basin and the interpeted sediment fans show that the sediment influx was mostly from south and southwest while sediment-body prograding out from the Faroe Platform is not found. This implies an uplift of the British Shelf area during Eocene time while the Faroe Platform area is close to sealevel. In Oligocene and Pliocene time six sediment fans are mapped showing that the sediment influx originated from the north and northwest and that the depocentre had moved in a westward direction closer to the Faroe Platform area.

The study shows that the actual distribution of deposits are controlled by localized uplift, activation of new structural elements and reactivation of older, Mesozoic basement structures controlling the material path way and restricting the depositional areas. The structural elements being activated and re-activated at different times cause considerable structural complexity. Understanding the structural elements and timing that controls the deposits is a tool for predicting material content in depositional units and a possible tool to show deviations from “normal” thermal subsidence.