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Structural and depositional evolution of the Lower Cretaceous in the Danish Feda Graben Area – an analysis based on 3D seismic data

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The Central Graben is part of a failed Mesozoic rift system located in the central North Sea basin. The first extensional tectonic phase in the Danish North Sea was initiated in Late-Paleozoic, continued to Late-Jurassic times and was followed by Late-Cretaceous lateral tectonic shortening resulting in basin inversion. Inversion structures superimposed onto Mesozoic extensional graben systems is a prominent feature in the Danish Central Graben. These structures are of interest in particular with respect to hydrocarbon prospectivity, since a large part of the plays in the Danish Central Graben are associated with inverted structures.
The Feda Graben is a Mesozoic fault-bounded basin in the NW part of the Danish Central Graben and experienced Late Cretaceous inversion, affecting especially the Lower Cretaceous, which reaches thicknesses of up to 1km. Deposition of the Lower Cretaceous units in the Feda Graben was primarily controlled by a major NE dipping fault bounding the Feda Graben to the SW against the Inge High. This normal fault experienced reverse reactivation during the inversion phase, causing the formation of anticlinal folds in the Lower Cretaceous units parallel to the fault. The inversion also controlled smaller scale faulting reaching the base of the Lower Cretaceous unit.
The inversion is generally interpreted as being due to crustal deformation in connection with Alpine tectonism. However, the presence of Zechstein salt has been documented from work in the Norwegian sector, and it also has a major presence in the southern Danish Central Graben. Still, the interaction between inversion- and salt tectonics has yet to be fully investigated.
In this study we present an analysis of the structural and depositional evolution of the Feda Graben based on 3D seismic attribute mapping, compare the old tectonic models from the ‘80s with new models and suggest a link between distribution and deformation of Zechstein salt and the inversion structures in the Central Graben in particular the Feda Graben.
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