Geophysical Research Abstracts
Vol. 20, EGU2018-14034, 2018
EGU General Assembly 2018

The Norwegian Sea area Permo-Triassic organic-carbon-rich deposits from seismic

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Seismic surveys of the Permo-Triassic successions in the Norwegian Sea area have been studied to predict their organic carbon content. These sequences have long been thought to incorporate Ravnefjeld Formation equivalent deposits postulated to lie in the deeper parts of the Helgeland and Froan Basins. The Ravnefjeld Formation is a late Permian organic-carbon-rich succession that has been extensively studied in the eastern Greenland. The available seismic surveys indicate deep and possible Palaeozoic reflectors within these basins but the deeper parts are unclear due to limitations in the seismic data quality. Here the amplitude versus offset (AVO) analysis technique is employed in combination with an assessment of strata-bound deformation structures to investigate the existence and distribution of possible Permo-Triassic organic carbon rich sediments.

Reflection from seismic surveys can display different AVO characteristics depending on the variation of the associated petrophysical properties and thus different AVO classes can be defined. AVO class IV has a negative normal incident reflection coefficient that decreases with offset and it has been used to predict the tops of organic-carbon-rich reflectors in this work. The intercept (I) and gradient (G) plots (IG-crossplots) together with the Near-Far offset amplitude comparison of the seismic surveys have been used to facilitate the AVO interpretation. The IG cross-plotting was done by selecting small windows (data probes) along the top reflector of the formations speculated to be organic-carbon-rich. Any data probe which displayed AVO class IV elements on the IG crossplots and exhibited amplitude dimming with offset has been considered to indicate the top of an organic-carbon-rich section.

The results of this work have predicted the presence of both Late Permian and Mid Triassic organic carbon rich sediments in the deeper parts of sub-basins within the Froan and Helgeland Basins in the Norwegian Sea area. The early Triassic sections did not show AVO characteristics indicative of organic-carbon-rich sediments on IG crossplots.