

Hydrocarbon prospectivity analysis in the Rockall basin (northern UK) based on 2D seismic interpretation and Petroleum Systems Modeling

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ABSTRACT

The UK Rockall basin is considered a frontier basin because of the lack of available information and the limited hydrocarbon exploration. One discovery well in the North Rockall basin and another one in the Irish area have proved the hydrocarbon potential of the basin. However, the presence, distribution and properties of the source rocks along the basin is still unknown.

The recently acquired seismic data in the basin allows for an improved and clearer image below the Tertiary lava flows and dolerite intrusions (sills), and thus, generates more expectation in the interpretation of the potential Mesozoic source rocks. The seismic line 2015.WG.FULL.17 of this improved seismic survey, which has an approximate length of 112 km and a depth up to 9000ms, was interpreted. The interpretation was converted to depth domain and subsequently used to build 2D Petroleum Systems Models (PSM). Two sets of boundary conditions (i.e. heat flow, sediment water interface temperature and paleowater depth) were derived from calibrated 1D PSM based on two wells located 15 km and 75 km southward.

This study analyzes the capacity of hydrocarbon generation. The results of the 2D PSM show favorable conditions for hydrocarbon generation in the basin, which are associated with two episodes of maturation, the first occurring in the Late Jurassic – Early Cretaceous, and the most significant in the Paleocene – Eocene. The 2D Petroleum Systems models show that the thermal influence of sills on maturation of organic matter is local and depends on its abundance. Additionally, the oil window depth is established between 2580 m and 4350 m at the present time in the study zone.

Keywords: UK Rockall basin, Petroleum System Modeling, source rock, seismic interpretation.

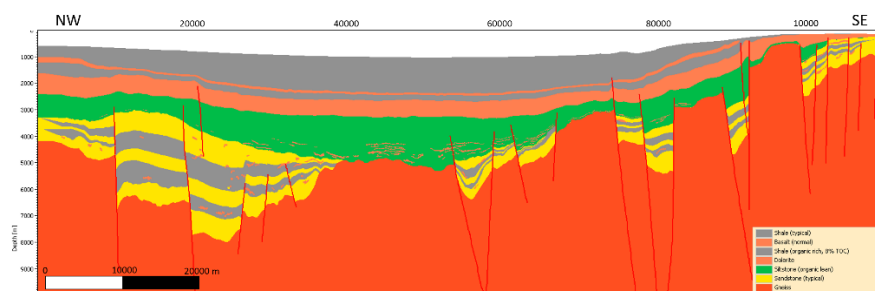


Figure: Depth interpretation of line 2015.WG.FULL.17. Input data for 2D Petroleum systems model