The relative balance between regional and local controls on sediment distribution in the Northern Faroe-Shetland Basin - Implications for development of a “Northern Gas Hub”

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Project outline:
As the UK undergoes an energy transition, gas will act as an important ‘bridge’ fuel needed for electrification of home, business and transport across the UK. That transformation requires an increase in electricity generation of up to 145%†. The northern Faroe-Shetland Basin (FSB) has the potential to become a new “Northern Gas Hub” supplying the aforementioned gas to the grid. Lying on the UK Atlantic Margin, it contains a series of stranded gas fields. However, disappointing well results in the past year (e.g. Lyon and Cragganmore) have placed this ‘Hub’ concept in jeopardy by illustrating the lack of understanding of Paleocene to Eocene reservoir distribution and quality in the area.

The aim of this project is to evaluate the latest well results and integrate them with legacy knowledge and data to improve our understanding and development of the key Paleocene to Eocene reservoir systems. The FSB, as a whole experienced dramatic yet transient uplift ~ 58 Ma (Fig. 1), linked to impingement of the Iceland mantle plume, causing periods of erosional incision into the basin and basin margin. Moreover, on a basin scale, igneous overthickening and the formation of volcanic centres (e.g. Erlend), acted to change basin floor geometry and topography creating localized sediment depocenters. The eruption of the Faroe-Island Basalt Group in the early Eocene, created a sub-aerial barrier in the north FSB/More Basin (Norway) area, leading to restricted marine input from the north. During the Balder Fm. times, major flooding and parasequence cyclicity led to a complex creation of turbidites interleaved with progression to fully marine conditions. The rapidity of change that the FSB sedimentary system underwent from the late Paleocene to Early Eocene is attested to by the fact that from initial uplift and incision to eventual marine transgression during Balder times, all occurred in only ~ 5 Ma. Micropaleontology will provide accurate chronostratigraphic template in which to place the reservoirs. Its
Integration with multivariate statistics, seismic interpretation and well analysis will enable the interplay of regional (basin-wide) vs. local controls on reservoir distribution and quality within the Northern FSB to be determined. In doing so, a better understanding of strategic reservoirs will allow potential new exploration targets to be identified and the true potential of the “Northern Gas Hub” to be assessed.

† Royal Society of Edinburgh Scotland’s Energy Future

Training and wider impact

The student will join a vibrant group of PhD students engaged in subsurface interpretation, broadly facing the energy sector. The student will have the opportunity to spend time working in the Australian School of Petroleum and Energy Resources in Adelaide, Australia.

As part of the GeoNetZero CDT, the student will undertake 20 weeks of training. The training curriculum covers a broad spectrum of geoscience and its applications e.g. Sedimentology, Stratigraphy, Tectonics, LiDAR, geo-informatics, reservoir management, but also subjects of more general application such as Artificial Intelligence, Machine Learning, Communicating Science and Career Development.

Recent relevant research from the team:


This is a full-funded 4-year PhD opportunity starting October 2020 as part of the Centre for Doctoral Training (CDT) in Geoscience and the Low Carbon Energy (GeoNetZero). The project is hosted at the University of Aberdeen. The CDT partnership is run by Heriot-Watt University.

https://geo-net-zero.hw.ac.uk/

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Applications to: https://www.abdn.ac.uk/pgap/login.php