NERC Centre for Doctoral Training in Oil & Gas (2017 start)

Project Title: **Tectono-Stratigraphic Development of the Rona Ridge, Faroe-Shetland Basin**

Host institution: Heriot-Watt University

Supervisor 1: John Underhill (HWU)

Supervisors 2/3: Rachel Jamieson (HWU) & Dr Caroline Gill (Shell)

Project description: The Faroe-Shetland Basin formed as part of a suite of basins developed along the NW European Atlantic continental margin. Exploration success led to development in a variety of Cenozoic and Palaeozoic clastic reservoirs such as the Palaeocene deep water sandstones (e.g. Schiehallion and Foinaven Fields) and Devono-Carboniferous Clair Group (Clair Field). More recent discoveries have been made in Pre-Cambrian fractured Lewisian metamorphic basement and Mesozoic clastics. However, despite an extensive exploration history, the Faroe-Shetland Basin today still lacks the detailed geological understanding that characterizes the neighbouring North Sea. Many vital components of the plays remain poorly documented and understood, including the maturation and charge history, the controls on and extent of the Cenozoic, Mesozoic and Paleozoic clastic systems and the role that late-stage uplift and exhumation played in the area. The Rona Ridge is a long-lived intrabasinal basement-cored high. It provides the ideal natural laboratory to study these parameters due to the high fidelity imaging of the entire stratigraphy afforded by its relatively shallow burial, prospectivity resulting from focused charge into the structural high and excellent data coverage. The main aim of this project is to place the Rona Ridge in general, and the Clair Field in particular in its regional context. The project will involve a detailed seismic stratigraphic and structural interpretation of the Upper Palaeozoic and Mesozoic succession and its Late Cretaceous-Recent post-rift cover, calibrated and complemented by well log analysis, core logging and possible field-based analog studies. The study will primarily focus upon understanding the tectonic and stratigraphic development of the structural high through the use of an extensive seismic and well database. Particular focus will be upon: (1) investigating the timing and mode of formation of, the original relief and the role that Upper Palaeozoic fault scarp degradation has had in controlling its preservation and distribution of Devono-Carboniferous reservoir sequences; (2) the impact that erosion of the ridge had in controlling Triassic, Jurassic and Lower Cretaceous clastic play fairways along the SE flank of the Rona Ridge (e.g. in Clair, Solan, Victory and Strathmore); (3) understanding the role that Paleogene uplift had in arresting petroleum charge and structural reactivation. The project will complement ongoing studies which are focusing on the Tertiary evolution of the UK and the late-stage structural evolution of the Atlantic margin. It is hoped that together these studies will provide a large-scale basin and margin-wide model that will enhance understanding of the region and improve the likelihood of exploration success in the future.

CDT Research theme(s):: The PhD is relevant to two of the four themes in the CDT initiative, namely: Extending the life of mature basins and exploration in challenged environments

Research context: The project complements existing PhD students and their projects in the Centre for Exploration Geoscience at HWU.

Research costs: All the key budget costs for hardware, software, data purchase, field and lab costs are covered either by the NERC RTSG or as part of the support from HWU. The seismic data has been accessed through Common Data Access (CDA), the portal by which offshore subsurface data is released into the public domain. Additional data is being supplied by PGS.

Career routes: The project will be ideal for a candidate seeking future employment in the oil and gas sector as an exploration geologists or geophysicist be it with an oil company or in the service sector. The project also lends itself to a career in academia, the BGS or government departments such as OGA & BIS.