



NERC Centre for Doctoral Training in Oil & Gas (2018 start)

Project Title: 'Overthickening' of the Cretaceous along the NE Atlantic Margin by Igneous Intrusions

Host institution: University of Aberdeen

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Supervisor 2: Dr D. Muirhead; S. Holford (University of Adelaide)

Project description:

Understanding when peak oil/gas generation occurs within sedimentary basins is a critical aspect of understanding petroleum systems and defining new plays. Along the NE Atlantic Margin, the deposition of large thicknesses of Cretaceous sequences burying the Jurassic source kitchen has long been a key and accepted part of basin modelling. However, work by the UoA has highlighted that the true thickness of the Cretaceous sedimentary section along the Atlantic Margin prior to the mid-late Palaeocene may have been drastically overestimated, as a large proportion of the current thickness of the Cretaceous sequences, presumed to be all sedimentary (ca. 2–2.5 km in thickest parts), may instead be composed of un-imaged primary igneous material in the form end-Cretaceous to Palaeocene aged sill intrusions. The total present-day thickness of the Cretaceous is therefore a function of both the Cretaceous sedimentary component *and* a Palaeocene intrusive volcanic component. This scenario has profound implications for basin modelling, sediment budget calculations and the understanding of the Cretaceous rifting history of the NE Atlantic; because the thickness of intrusions (> 1km in places) needs to be removed in order to correctly represent the true thickness of the Cretaceous sedimentary pile along the Atlantic Margin prior to sill emplacement during the Palaeocene. Work conducted in 2017 jointly between the University of Aberdeen and Industry has found that removal of the igneous intrusions can have a drastic effect on petroleum system timing and the point of peak oil/gas generation.

The aim of the project is to map out all intrusions through the NE Atlantic Margin Basins using a margin-wide seismic and well database. Thickness estimates of the igneous intrusions will then be used to produce a margin-wide restoration of the true thickness of the Cretaceous sedimentary sequences (prior to igneous intrusion) along the NE Atlantic Margin. This will then be integrated with basin modelling and extensive well and geochemical data to understand the evolution and rifting history of the NE Atlantic Margin through the Cretaceous to Palaeocene

CDT Research theme(s):

This project links to **CDT Research Theme: Exploitation in Challenging Environments** – enhancing knowledge in the exploration frontier of the NW European continental margin.

Research and training context:

The student will receive training in seismic interpretation, physical volcanology, basin analysis, petroleum systems modelling and organic geochemistry. The student will also spend 1 month at the University of Adelaide (Australian School of Petroleum) receiving training on subsidence and uplift within sedimentary basins. The student will have a multidisciplinary skill-set either to undertake a range of roles in industry or academia. The student will join a large cohort of HC focused PhD students.

Research costs: will be met by the RSTG – with UoA funding extra costs.

Career routes: The student will be well placed for a career in research, exploration & production geoscience. The project will include the use of industry data and software.