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

Project Title: **Middle to Late Jurassic global palaeoenvirinmental events in the Arabian Gulf region: chemostratigraphy, cyclostratigraphy, and sedimentology.**

Host institution: University of Exeter, Camborne School of Mines (CSM)

Supervisor 1: Prof. Stephen Hesselbo (University of Exeter, CSM)

Supervisor 2: Dr Aisha Al Suwaidi (Petroleum Institute, Abu Dhabi, UAE)

Additional Supervisors: Dr Micha Ruhl (University of Oxford)

Project description: Jurassic strata host some of the world's most prolific hydrocarbon source rocks and potential unconventional gas resources (e.g. Posidonia shale, Bossier, etc.). Many source rocks in the Mesozoic can be confidently related to global palaeoenvironmental change events, such as Oceanic Anoxic Events. However, knowledge of distributions and origins of these rocks is focussed on well-known age intervals and limited geographic regions. Some recent datasets show that the Middle-Late Jurassic time interval may have been subject to previously unknown global events, expressed in the rock record as geochemical excursions and organic-rich shales. This project focusses on cores and outcrop from the United Arab Emirates and Oman and aims to understand the resource occurrence and quality in the Gulf region and beyond, and to link these to fundamental Earth system processes. The project will apply fieldwork, sedimentology, petrography, geochemistry (XRF), carbon-isotope chemostratigraphy (organic and carbonate carbon), and cyclostratigraphy, to reconstruct conditions during deposition and predict the distribution and quality of organic matter in fine grained basinal sediments.

CDT Research theme(s):
Effective production of unconventional hydrocarbons. Basinal middle-late Jurassic deposits are currently targets for unconventional gas exploration in the Arabian Gulf. Shales with organic enrichment are known for this time interval and region, but their stratigraphy and depositional settings are inadequately known.

Research context:
This project will be hosted within the Deep Time Global Change group at CSM, where projects investigating palaeoclimate, sedimentology, petrography and organic matter dissemination within source-rocks are underway, using a variety of analytical techniques including stable isotopes and state-of-the-art SEM analysis.

Research costs:
Fieldwork/core work in UAE/Oman (x2 trips): £3.5k; Stable isotope analysis: £6.5k; SEM/QEMSCAN analysis: £4k. (RockEval and some isotopic analysis is free through the Petroleum Institute contribution and Dr Al Suwaidi); Conference attendance (e.g. GSA, AAPG): £3k; Central CDT Training Academy activities: £2k.

Career routes:
The student will be trained in a variety of geological techniques and transferrable skills important in the energy and environment industry, including stratigraphy, geochemistry, carbonate and shale sedimentology and cyclostratigraphy. The student will also gain skills allowing them to pursue postdoctoral research or a further academic career in a broad range of disciplines across the geosciences.