

## Oil & Gas Training Academy PhD Studentship (2018 start)

**Project Title:** Biostratigraphic and geochemical investigation of Jurassic source rocks of the UK and Norwegian North Sea

**Host institution:** University of Exeter

**Supervisor 1:** Sev Kender

**Supervisor 2:** Stephen Hesselbo

**Additional Supervisor(s):** Erik Anthonissen (Statoil); Melanie Leng (BGS); Philip Copestake (Merlin Energy Resources Ltd); Ken Miller (Rutgers University, USA)

**Project description:** Biostratigraphic and geochemical investigation of Jurassic source rocks of the UK and Norwegian North Sea

Jurassic strata of the UK and Norwegian continental shelf are commonly composed of thick units of organic-rich mudstones that form critical source rocks for the North Sea and other areas. Whilst the Upper Jurassic strata are known to be some of the best source rocks on Earth, Lower Jurassic potential has yet to be fully understood. For example, both Lower and Upper Jurassic strata make up extensive tracts of potential oil shales in the Weald Basin which has received particular interest in recent years (Andrews et al. 2014). Lower Jurassic source rock quality will be addressed with cored material presenting a unique record. The Lower Jurassic is also of immense palaeoclimatic interest, with multiple carbon isotope excursions during the Sinemurian, Pliensbachian and Toarcian in the oceans and on land that signify global carbon cycle perturbations. This project seeks to carry out a biostratigraphic (foraminifera) and palaeoenvironmental (carbon isotopes, total organic carbon and organic carbon pyrolysis) analysis of new and legacy cores. Analyses will be carried out on key boreholes from onshore UK and the Norwegian shelf, for which some palynological biostratigraphy is already available. These new data will be tied to existing detailed UK outcrop/borehole studies, and provide a basis for a new supra-regional synthesis of stratigraphic and source rock potential and palaeoclimatic reconstruction for the Lower Jurassic. This study will be part of the international JET (Jurassic Earth System and Timescale) project.

Reference: Andrews, I.J. 2014. *The Jurassic shales of the Weald Basin: geology and shale oil and shale gas resource estimation*. British Geological Survey for Department of Energy and Climate Change, London, UK.

### **Match to Major Research theme(s):**

- a. Effective production of unconventional hydrocarbons: This project is characterising the depositional environment the best quality oil shales in the UK, which are present in the Weald Basin, allowing prediction of 'sweet spots' for unconventional production.
- b. Extending the life of mature basins: This is refining the understanding of the petroleum system and assessing the potential of lower Jurassic source rocks of the North Sea, Irish Sea and North Atlantic.

### **Research context (links to existing research programmes):**

JET (ICDP/NERC project) – 2018/2019

Statoil internal research programme of the lower Jurassic source rock potential of the North Sea

### **Outline of research costs:**

Carbon isotopes, Rock Eval, TOC x400 samples - £4,000

Micropalaeontology consumables - £200

Travel and subsistence for core sampling, training, conference attendance - £3,000

Publication costs - £1,000

**Career routes:** The student will gain experience in biostratigraphy and geochemistry of major source rocks that are directly applicable to the oil and gas industry, both in terms of conventionals and unconventional, and applicable to an academic career in research.