



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

Project Title: Jurassic Oceanic Gateways of the North Atlantic
Host institution: Cardiff University (70%), University of Exeter (25%), British Geological Survey (5%)
Supervisor 1: Tiago M. Alves
Supervisor 2: Stephen Hesselbo (University of Exeter)
Additional Supervisor (s): Tim Paraoh (BGS)

<p>Project description: Jurassic rifting and breakup are still poorly understood in the North Atlantic region, particularly when considering that large swathes of NW Europe record the development of proto-oceanic gateways as early as the Late Triassic-Jurassic [1]. The first of these proto-oceanic gateways to form, and to effectively link the North and Central Atlantic regions, was the Iberia-Newfoundland gateway with its prolongation towards Ireland and the North Sea. Following widespread evaporite deposition in the Late Triassic-earliest Jurassic, marine strata were first deposited during the Sinemurian in West Iberia. Black shales were episodically developed during the Pliensbachian-Toarcian and again during Oxfordian-Kimmeridgian. Outcrop and borehole data provide information on these periods of basinal deoxygenation in Iberia, Southern UK, and in extended areas of the Central North Sea [2]. However, an integrated analysis of the petrophysical, geochemical and stratigraphic significance of 'North Atlantic' black shale events is still to be undertaken to unravel the tectonic, climatic, and eustatic controls. The project will use seismic, borehole and outcrop data from West Iberia, Canada, Southern UK and North Sea to investigate the conditions in which Jurassic black shales were deposited. We aim to document at seismic, borehole and outcrop scales the occurrence (and distribution) of these black shale events and to understand the main local and regional controls on their generation, and at what time and length scales these operate. The student will interpret a suite of 50+ boreholes from the region, tying stratigraphic, petrophysical and geochemical information to 2D and 3D seismic data. In parallel, field analogues from the Lusitanian (Portugal) and Wessex Basins (England) will be comprehensively studied and sampled. Data from these sites are necessary to correlate petrophysical, seismic and geochemical data at different scales, and to document the stratigraphic architecture of black shales. Training in seismic interpretation will be provided using state-of-the-art workstations. Following a recent upgrade, Cardiff houses one of the most advanced seismic interpretation laboratories in Europe and the student will have access to leading edge computational facilities, namely Schlumberger's Petrel®, CGG-Veritas Hampson-Russell® and IKON Rock-Doc® for petrophysical modelling and borehole analyses. IGI Ltd. will provide geochemical data and the P:IGI software.</p> <p>References cited: [1] Hesselbo, S.P. (2007). Earth and Planetary Science Letters, 253, 455-470. [2] Pereira, R. and Alves, T.M. (2012). Tectonics, TC4001.</p> <p>CDT Research theme(s): Effective production of unconventional hydrocarbons; Extending the life of mature basins; Exploitation in Challenging Environments.</p>

<p>Research context: The project is original and will add to research being developed in the 3D Seismic Lab (Cardiff) at Exeter (Hesselbo) and BGS. IGI Ltd. will provide new software and quantitative tools for the geochemical analysis of core and outcrop samples.</p>
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<p>Research costs: Cardiff University will provide the amount requested to associate partners via College funds. Borehole and ancillary geophysical data will be provided by the BGS and IGI Ltd.</p> <p>Career routes: Exploration, production geoscience, environmental geoscience for oil and gas. Consultancy and Service Provision. The student will be trained on state-of-the-art 3D seismic interpretation, borehole analysis and advanced field techniques.</p>
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Submissions must conform to this single-sided A4 format. The Awards Committee reserves the right not to consider submissions that do not adhere to this condition.