Proposed Studentship - *Funded*

Mixed siliciclastic-carbonate deposits of the Upper Miocene Betic Corridor (Guadix Basin, Spain): outcrop analogue of subsurface reservoirs

Fully funded, 4-year PhD opportunity

Supervisor(s): Dr. Domenico Chiarella, Prof. Francisco J. Hernández-Molina (Department of Earth Sciences, Royal Holloway University of London), Dr. Fernando García-García (University of Granada, Spain) & Dr. Lorena Moscardelli (Equinor)

Project Description:

Subsurface storage of carbon will play a fundamental role in the Energy transition phase and will be important for the UK to meet net-zero greenhouse gas emissions by 2050. The North Sea already represents a focus area for offshore carbon capture and storage and its role will increase in the coming years with reservoir units investigated as potential storage sites. Moreover, the increasing focus on near-field exploration contribute to maximise existing resources and facilities.

Mixed siliciclastic-carbonate deposits form a peculiar type of system sensible to autocyclic and allocyclic factors related to the combination of physical and biological processes. Resulting large- and small-scale geometries and architectures have an impact on the reservoir heterogeneity. This is extremely important because many potential North Sea reservoirs, although not described in the literature as mixed in composition, are characterised by a combination of siliciclastic and carbonate sediments at different scale of observation. Accordingly, a proper understanding of these aspects from different scales of observations is important for a correct reservoir modelling. A combination of compositional and strata mixing of siliciclastic, mixed and carbonate units represents the sedimentary record of the last tectonic stages of the Betic Cordillera before the Messinian Salinity Crisis.

The project will benefit of well exposed outcrops positioned within the Guadix Basin, integrated with digital outcrop models allowing a 3D control of the large-scale geometries and evolution of the system, and stratigraphic (seismic) scale characterisation of the deposit. Moreover, 60 m cored research boreholes of the studied outcrops, accompanied by a suite of well logs and thin sections already available for the project, give the possibility to characterise the deposits at a lithofacies- and bed-scale. This multi-scale analysis allows to proper emphasise the shadow areas typical of the outcrop- and core/wireline logs-alone studies.

The integration of outcrop, core and well log data coming from the same deposits represents a unique dataset to (i) characterize the mixed deposits and their reservoir properties, and (ii) compare the reservoir quality of siliciclastic versus mixed carbonate-siliciclastic systems suitable for both hydrocarbon and CCS, and (iii) reduce the gap between large- (e.g. outcrop and seismic) and small-scale (e.g. core, wireline logs and thin sections) data. The project will benefit of the portable air permeameter available at the CSI group useful to measure permeability of outcrops sections. The PhD student will benefit from training organised by the CSI (RHUL) and SEDREGROUP (Univ. of Granada) research groups.

Benefits:

This proposal is part of the multi-University, industry-funded Doctoral Training Centre in "Geoscience and the Low Carbon Energy Transition - GeoNetZero". The successful applicant will therefore be on a PhD programme with exceptional benefits including:

- Fees and maintenance fully funded for 4 years.
- Additional £20k of research support funding (e.g. for conference attendance).
- 20 weeks of mandatory vocational training and industry links to enhance employability.
- Industry links.

Eligibility:

UK nationals are eligible for a full award. For EU nationals starting a degree in 2021/22, the UK Government has confirmed that you will not be eligible to pay the same fees as UK students. This means you will be classified as an international student. At Royal Holloway, we wish to support those students affected by this change in status through this transition. For eligible EU students starting their course with us in September 2021, we will award an automatic fee reduction which brings your fee into line with the fee paid by UK students. This will apply for the duration of your course.

Closing date for applications 1st February 2021
Shortlisted applicants will be interviewed on 24th February 2021

Applications should be made via the Royal Holloway Direct website:
https://www.royalholloway.ac.uk/studying-here/applying/research-degrees/how-to-apply/

Please contact the lead supervisor directly for further details

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