PhD Studentship: Impacts of fracking fluids on microbial communities in shale basins

Dr Heather Buss, Professor Michael Kendall (School of Earth Sciences, University of Bristol) and Professor Fred Worrall (Department of Earth Sciences, Durham University)

Project enquiries: Dr Heather Buss, h.buss@bristol.ac.uk

Start date: flexible, between January and September 2019

Project Description: Introduction of fracking injection fluids to groundwater environments has the potential to alter the composition and function of resident microbial communities. Although several recent studies measured microbial diversities and activities in hydraulically fractured shales and associated waters, the potential impacts on resident microbial communities of fracking fluids, flowback and produced water are unknown. These fluids can change the chemistry of the microbial habitat, for example, by changing the availability and type of substrate for metabolism, the redox state, pH, and salinity, as well as physical parameters such as pressure. This project will investigate the potential effects of fracking fluids on microbial communities using a combined experimental and computer modelling approach.

Laboratory-based microcosm experiments will be used to test the response of microbial communities to fracking fluids and related changing environmental conditions, which will be manipulated in the laboratory. Geochemical modelling will be used to further assess the potential effects of fracking fluids and associated environmental changes on the growth rates of near-surface and sub-surface microorganisms utilizing a range of different metabolic processes under field specific conditions. Overall, this work will enable better assessment of the environmental risks of fracking and will enable the student to pursue careers in academia, environmental consulting, industry or the public-sector.

This studentship is part of the SHAPE-UK research project, led by the University of Bristol, with collaborators at the British Geological Survey and the Universities of Durham, Newcastle, Leeds and Liverpool. SHAPE-UK is funded by the Natural Environment Research Council (NERC) as part of their programme on Unconventional Hydrocarbons in the UK Energy System: Environmental and Socio-economic Impacts and Processes. The student will participate in SHAPE-UK project field trips, workshops, and meetings, developing their interdisciplinary understanding by interacting with a range of scientists and project partners.

Training: The student will benefit from studying a timely, applied topic from a highly interdisciplinary perspective, and by training in highly sought after skills in bioinformatics and geochemical modelling, in addition to geomicrobiological and geochemical concepts and laboratory techniques. The student will be supported to participate in NERC GW4+ DTP training courses (e.g., statistics, bioinformatics, computer programming) and will have access to a wealth of training opportunities from the Bristol Doctoral College’s Personal and Professional Development Programme, which offers a wide range of workshops, seminars, and online resources covering topics such as productivity, project management, writing, resilience and wellbeing, public engagement, research ethics, IT skills, careers prep, data sharing, and teaching. The student will also have the opportunity to develop teaching skills by demonstrating for undergraduate classes.

Funding and eligibility: This PhD studentship is fully funded by the Natural Environment Research Council (NERC) and includes 3.5 years of PhD tuition, fees, living stipend and research costs. The ideal candidate will have a strong background (preferably MSc-level) in a relevant discipline, such as Geoscience, Geology, Microbiology, Molecular Biology, Environmental Chemistry, or Biology, with a particular interest in environmental geomicrobiology and geochemistry.

Entry requirements: http://www.bristol.ac.uk/study/postgraduate/2019/sci/phd-earth-sciences/

How to apply: http://www.bristol.ac.uk/study/postgraduate/apply/