

## Microbial and biogeochemical processes through the ocean-sediment continuum.

### Advisors:

Dr. James Bradley, Prof. Mark Trimmer,  
Prof. Kate Spencer, *Queen Mary University  
of London, UK*

### Location:

Queen Mary University of London, UK.



**Summary:** The interface between the ocean and subseafloor sediments is a critical boundary that influences life in the deep biosphere, the transport and transformation of organic carbon and nutrients, and the global carbon cycle. Microorganisms unify the various factors that determine the reactivity and fate of organic carbon deposited on the seafloor, and persist deep into subseafloor sediments over extraordinarily long timescales. Their extended survival and very slow metabolisms constitute an important analogue to the potential for life beyond Earth. This PhD project will develop and implement a numerical modelling framework to capture the transfer of carbon and microorganisms from the water column into sediments, and their subsequent burial. The model will be used to address how microorganisms endure, proliferate, and assemble in deep subsurface settings, as well as quantify carbon and nutrient transformations. This PhD project provides the opportunity to work at the frontier of modelling and deep biosphere science. Findings resulting from this PhD will provide quantitative insight into microbial and geochemical coupling in deep marine settings, and insight into the limits of life. The project would suit a computationally minded and numerate student with an interest in geomicrobiology, life in extreme environments, and global biogeochemical cycling.

**Policy Impact of Research:** Understanding the impact of microorganisms on the subseafloor stores of organic carbon will be a powerful tool for policy makers and stakeholders. The project will produce methods and software that will be released on an open source and freely available platform that can be applied by anybody. The analysis and understanding of complex interactions and feedbacks between microorganisms and their environment will inform management decisions including conservation strategies, the designation of marine protected area implementations and subseafloor exploration, particularly in light of the developing interest in deep sea mining.

**How to apply:** Opportunities for funding include London NERC DTP and QMUL Principal's Postgraduate Research Studentships. For further information about the project, eligibility and future application deadlines in 2020/21, please contact Dr James Bradley ([james.bradley@qmul.ac.uk](mailto:james.bradley@qmul.ac.uk)).

**Eligibility Criteria and Candidate Profile:** Scholarship opportunities are available to candidates of any nationality. Candidates must hold a degree in the natural or physical sciences (e.g. Biology, Earth Sciences, Chemistry, Physics, Mathematics, Geography, or related discipline). I am looking for highly motivated, independent students with good communication skills. Previous research experience and knowledge of oceanography, microbiology, biogeochemistry and/or modelling is desirable.

### English Language:

If you are from a non-English speaking country, you will need to provide evidence of English language ability according to the QMUL policy for postgraduate students. For candidates who have not yet met these requirements, we will include this as part of your offer conditions.

For further information on the research area, please visit: <http://www.jbradleylab.com>