

**School of Geography**  
**Post title: Postdoctoral Research Associate in Atmosphere Microbial  
Habitability Modelling**  
**Post ref:**

**About the Role**

The Earth Surface Science group at Queen Mary University of London (QMUL) are seeking a 24-month PDRA to work on a Human Frontier Science Project (HFSP) funded project 'The atmosphere: a living, breathing ecosystem?'. The project is a collaboration between QMUL's School of Geography, the University of Guelph (Canada), Monash University (Australia) and Arizona State University (USA).

The team aim to resolve the composition, capabilities, and activities of atmospheric microbes at a global scale, with the overall goal to distinguish whether the atmosphere exhibits structure and microbial activity characteristic of a true ecosystem, or if it is simply a passive dispersal medium for microorganisms.

The PDRA will develop theoretical modelling approaches (including bioenergetics calculations, power-based ecosystem modelling) to investigate the potential habitability and ecological structure and function of microbial communities in the atmosphere. The initial focus for the PDRA is to model the habitability and ecological processes occurring in Earth's atmosphere, and then to translate the tools and knowledge generated to the atmosphere of other planetary bodies or exoplanets.

The postdoc will be embedded within a larger team of microbiologists, geochemists, engineers and astrobiologists (in the UK, Canada, the US and Australia) who are working collaboratively, via our recent Human Frontier Science Program award, to understand the atmosphere as a 'living, breathing ecosystem'. Aside from the main modelling duties, the PDRA will have the opportunity to participate in our global sampling campaign and is expected to interact frequently with other members of the larger team to assist with the generation and interpretation of biological, geochemical, and geophysical data (and its integration into numerical models), and contribute towards the team's outputs and dissemination activities.

The PDRA will develop, implement and apply microbial bioenergetics ecosystem modelling tools to study the atmosphere, including its resident microorganisms and its overall habitability.

Modelling will focus on:

- (i) Connecting the physicochemical characteristics of the atmosphere with its (potentially) resident microorganisms.
- (ii) Determining plausible rates of energy-generating and energy-requiring reactions for atmosphere dwelling microorganisms and assess catabolic and anabolic activity.
- (iii) Combining various (biological, geochemical and geophysical) datasets to assess the survival and potential growth of atmosphere-dwelling microorganisms (using data generated by the project, as well as existing data).
- (iv) Assessing habitability of Earth's atmosphere and habitability indices of the atmospheres of other planetary bodies.

The PDRA will be a full member of the HFSP research and as well as modelling, is expected to participate in the team's data analyses and synthesis efforts, participate in cross-discipline collaboration, training and knowledge sharing exercises, and may take part in fieldwork.

The PDRA will be expected to lead the presentation of findings at national and international conferences, and publish in leading academic journals.

The post will be supervised by Dr. James Bradley at Queen Mary University of London.

**About You**

Applicants must have a PhD (by time of appointment) in a relevant natural science discipline, and a track-record of research productivity, including peer-reviewed publications. Candidates should have experience in numerical/bioenergetic/ecosystem/habitability modelling, and good understanding of microbial processes in

the context of habitability and astrobiology. Candidates should demonstrate initiative and the ability to work independently.

### **Research**

- To undertake research as appropriate to the field of study.
- Develop new concepts, ideas and tools to extend the intellectual understanding of atmosphere habitability and habitability modelling.
- To develop and apply bioenergetic and ecosystem modelling approaches to assess the habitability and ecosystem structure of Earth's atmosphere (and the atmospheres of other planetary bodies).
- To develop and address specific research questions and objectives related to the project.
- To use biological, geochemical and geophysical datasets emerging from the HFSP project, field campaigns, and existing datasets to inform model simulations.
- To acquire, process, analyse and interpret datasets.

### **Preparation of Publications/Dissemination**

- To be lead and co-author on peer-reviewed papers in international journals.
- To present research at national and international conferences.
- To contribute to dissemination and impact activities of the HFSP project.
- To collate and catalogue numerical modelling and associated data for compilation with the HFSP project for deposition and archiving in data repositories.

### **Other**

- To be a full member of the HFSP research team, under the supervision of Dr James Bradley.

### **About the School/Department/Institute/Project**

The School of Geography at Queen Mary University of London is internationally recognized for its theoretically informed, empirically grounded and politically engaged research, and remains one of the top departments for Geography and Environmental Sciences in the UK (REF 2014).

### **About Queen Mary**

At Queen Mary University of London, we believe that a diversity of ideas helps us achieve the previously unthinkable.

Throughout our history, we've fostered social justice and improved lives through academic excellence. And we continue to live and breathe this spirit today, not because it's simply 'the right thing to do' but for what it helps us achieve and the intellectual brilliance it delivers.

We continue to embrace diversity of thought and opinion in everything we do, in the belief that when views collide, disciplines interact, and perspectives intersect, truly original thought takes form.

### **Benefits**

We offer competitive salaries, access to a generous pension scheme, 30 days' leave per annum (pro-rata for part-time/fixed-term), a season ticket loan scheme and access to a comprehensive range of personal and professional development opportunities. In addition, we offer a range of work life balance and family friendly, inclusive employment policies, flexible working arrangements, and campus facilities including an on-site nursery at the Mile End campus.

The post is based at the Mile End Campus in London. It is full time (35 hours per week), fixed term appointment for 2 years, with an expected start date in September 2023 or as soon as possible after that date. The starting salary will be £40,223 (Grade 4) per annum, inclusive of London Allowance.

Queen Mary's commitment to our diverse and inclusive community is embedded in our appointments processes. Reasonable adjustments will be made at each stage of the recruitment process for any candidate with a disability. We are open to considering applications from candidates wishing to work flexibly.

Informal enquiries should be addressed to Dr. James Bradley at [james.bradley@qmul.ac.uk](mailto:james.bradley@qmul.ac.uk).

To apply for the role, please visit:

<https://www.qmul.ac.uk/jobs/vacancies/items/8632.html>

**Applications should include:**

- A cover letter (max. 2 pages) stating your motivation for applying to this position, research interests, relevant skills, training and experience.
- Curriculum vitae.
- Copy of official transcript(s).
- Contact information for at least two and up to 3 references.

**Important:** Please also email Dr. James Bradley ([james.bradley@qmul.ac.uk](mailto:james.bradley@qmul.ac.uk)) to confirm your intention to apply.

**The closing date for applications is 25<sup>th</sup> August 2023.**

**Interviews (remote or in-person) are expected to be held in early September 2023.**