



**Trinity College Dublin**  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin



*The Departments of Geology and Botany at Trinity College Dublin, The University of Dublin, seek applicants for a 4-year fully funded PhD-project, to assess the link between large igneous province volcanism and past climate change, carbon cycle perturbations and global mass extinctions.*

The project:

### **Deadly kiss of the LIPs:**

*Did **L**arge **I**gneous **P**rovince volcanism cause global carbon cycle change and mass extinction in Earth's past?*

### **Project description**

Earth history is marked by major climatic and environmental change events, often associated with major global carbon cycle perturbations and marine and terrestrial mass extinction. These events have been linked to Large Igneous Province (LIP) volcanism, through which millions of cubic kilometres of volcanic (basaltic) rock were emplaced onto the Earth surface within  $10^4$ – $10^6$  years, potentially leading to the rapid and massive release of greenhouse gasses (e.g. CO<sub>2</sub> CH<sub>4</sub>) and toxic compounds into the ocean-atmosphere system.

Two of the largest of these events occurred in the Early Jurassic (from ~201–175 million years ago) and are known as the Triassic–Jurassic Mass Extinction (~201.5 million years ago) and the Toarcian Oceanic Anoxic Event (T-OAE; ~183 million years ago), which have been tentatively linked to the emplacement of the Central Atlantic Magmatic Province and the Karoo-Ferrar Large Igneous Province, respectively.

Major uncertainty, however, exists on the timing and intensity of Early Jurassic LIP volcanism, the associated elevated fluxes of carbon and toxic compounds (e.g. mercury) into the global ocean-atmosphere system (impacting on atmospheric  $p\text{CO}_2$  and ecosystem toxicity), and their potential causal role in initiating positive and negative feedback mechanism and associated changes in global climate and the environment across the Early Jurassic and particularly during the Triassic–Jurassic Mass Extinction and the Toarcian OAE.

The project will study Early Jurassic marine and continental sedimentary archives in Europe and China that hold crucial physical, chemical and biological materials and information to constrain the mechanistic processes that governed two of the largest climatic, environmental change and mass extinction events in Earth's past.

The project will focus on 3 integrally linked Research Objectives:

- 1) To quantify the magnitude of Early Jurassic carbon release and sequestration, and associated changes in the global carbon cycle and atmospheric carbon dioxide concentrations;
- 2) To constrain the magnitude and intensity of Large Igneous Province volcanism and the associated release of toxic compounds, and its (causal) link to past, elevated carbon release, climate change and mass extinction;
- 3) To astrochronologically quantify the timing and magnitude of changes in Early Jurassic carbon and mercury fluxes into the global ocean-atmosphere system, and the rate of change in atmospheric  $p\text{CO}_2$ .

## Person specification

Applications are invited from students who can demonstrate a solid background in integrated stratigraphy, organic/inorganic geochemistry, palaeobotany, palaeoceanography and/or palaeoclimatology. Passion for laboratory work, as well as fieldwork and/or core sampling, and a keen interest and self-motivation for solving problems is essential. Candidates must have an excellent, relevant geoscience honours degree or a geoscience MSc degree.

This project will cover full tuition fees (EU or non-EU) for a period of 4 years for a new entrant fulltime PhD candidate. The candidate will receive a stipend of €16,000 per year. **The projected start date is 1<sup>st</sup> September 2019.**

The PhD student will be based at Trinity College Dublin, The University of Dublin, at the Department of Geology, and will be co-hosted at the Department of Botany, both at the School of Natural Sciences. She/he will be expected to undertake national/international fieldwork and/or core-sampling activities, as well as present results at national and international conferences.

If interested, please apply by sending an e-mail containing (in PDF-format): (1) a full CV (when applicable including a publication list), (2) a cover letter stating why you are interested in this project, and why you and your academic background make you the ideal candidate for this project, and (3) the names and contact details of two academic referees, to **Dr Micha Ruhl**. See contact details at the bottom of this page.

The closing date for applications is **March 31<sup>st</sup>, 2019**. Enquiries for further details can be directed to Dr Micha Ruhl or Prof Jennifer McElwain.

## Trinity College Dublin

Founded in 1592, Trinity is at the nexus of tradition and innovation, offering undergraduate and postgraduate programmes across 24 schools and three faculties: arts, humanities, and social sciences; engineering, maths and science; and health sciences. Spread across 47 acres in

Dublin's city centre, Trinity's 17,000-strong student body comes from all 32 counties of Ireland, and 16% of students come from outside the country. Of those, 40% are from outside the European Union, making Trinity's campus cosmopolitan and bustling, with a focus on diversity.

Further details of the Geology Department, the School of Natural Sciences and Trinity College Dublin can be accessed at:

<http://www.tcd.ie/Geology/>  
<http://naturalscience.tcd.ie/>  
<http://www.tcd.ie/>

This doctoral project is funded as part of Trinity's 'Provost's PhD Project Award' Program, which are generously funded through alumni donations and Trinity's Commercial Revenue Unit.

The PhD student will also be part of the Irish Centre for Research in Applied Geosciences (iCRAG). iCRAG is funded under the SFI Research Centres Programme and is co-funded by the European Regional Development Fund and industries. Further details of iCRAG can be accessed at:

<https://www.icrag-centre.org/>

### **Contact information**

Dr. Micha Ruhl  
Department of Geology  
Museum Building  
Trinity College, Dublin 2, Ireland

**Email:** [micha.ruhl@tcd.ie](mailto:micha.ruhl@tcd.ie)

**Website:** [www.tcd.ie/Geology/people/ruhlm/](http://www.tcd.ie/Geology/people/ruhlm/)

**Personal website:** [www.micharuhl.com](http://www.micharuhl.com)

Prof Jennifer McElwain  
Department of Botany  
Trinity College, Dublin 2, Ireland

**Email:** [jmcelwai@tcd.ie](mailto:jmcelwai@tcd.ie)

**Website:** [www.tcd.ie/Botany/people/JMCELWAI/](http://www.tcd.ie/Botany/people/JMCELWAI/)