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***Fully funded PhD Studentship available***

## **Global weathering rates and sediment fluxes during early Cenozoic hothouse climates**

School of Earth Sciences, University College Dublin, Ireland

*Applications are invited from suitably qualified candidates for a full-time PhD (Structured PhD programme) on “Global weathering rates and sediment fluxes during early Cenozoic hothouse climates”. The project is funded by iCRAG, the SFI Research Centre in Applied Geosciences.*

### **Project background and description:**

The Paleocene and Eocene time periods, including the Paleocene–Eocene Thermal Maximum (PETM), are characterized by strongly enhanced greenhouse warming, and the most abrupt climate changes of the past 65 million years. The PETM is considered the closest natural analogue to anthropogenic rates of global warming and carbon degassing, which occurred over a few thousand years, likely related to the emplacement of the North Atlantic Igneous Province.

Silicate weathering represents a major feedback mechanism in the Earth’s climate system, helping to stabilize atmospheric CO<sub>2</sub> levels and temperature on million-year time scales. On shorter time scales of greater relevance to understanding the fate of anthropogenic CO<sub>2</sub>, the efficacy and responsiveness of silicate weathering is less clear. At the same time, changes in sedimentary responses, as reflected by strongly elevated sediment fluxes to marginal marine settings have been observed across the PETM, likely to have resulted from climate warming, intensified hydrological cycling, and elevated physical erosion rates and sediment supply to marine depositional environments. Although both chemical and physical weathering (and erosion) are largely driven by elevated hydrological cycling, different response rates to global carbon cycle change and associated warming murk our understanding of their primary drivers.

This project will apply a multi-proxy approach using sedimentology, clay mineralogy, elemental and isotope geochemistry (Os isotopes) to investigate the continental margin of the NE Atlantic, and potential other marginal marine basins to improve our understanding of the primary drivers of changes in the hydrological cycle, and weathering and erosion rates in response to the early Paleogene hothouse climates. The outcome will constrain the significance of a key Earth system feedback process that controls intermediate/long-term carbon sequestration and the response of near shore sediments to climate change, providing critical insight for future climate projections.

The project will utilize the crucial sedimentary archives obtained through the International Ocean Discovery Program (IODP) Expedition 396 (Aug–Oct 2021; Mid-Norwegian Margin

Magmatism and Paleoclimate Implications), as a result of the PI's participation to IODP as an Ireland-based researcher. The student will have the opportunity to engage and collaborate with the IODP Expedition 396 shipboard scientists to maximize the research outcome.

General training will be provided in sedimentology, stratigraphy, geochemistry, clay mineralogy, carbon cycling, palaeoceanography and palaeoclimatology. Specific training includes but not limited to the use of metal-free laboratories and analytical methods (ICP-MS, MC-ICP-MS, TIMS), at the National Centre for Isotope Geochemistry, School of Earth Sciences, University College Dublin; the use of XRD and the study of clay mineralogy at the Biogeosciences Laboratory, Université Bourgogne Franche-Comté.

The successful applicant will be based at the School of Earth Sciences, University College Dublin (UCD), where they will work together with Dr Weimu Xu (primary supervisor) and affiliated iCRAG, UCD and international partners. They will be expected to undertake national/international fieldwork and/or core-sampling activities, as well as present results at national and international conferences.

**Requirements/ Person specification:**

Applications are invited from students who can demonstrate a solid background in sedimentology, integrated stratigraphy, inorganic geochemistry, clay mineralogy, 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 obtained an excellent, relevant geoscience honours degree or (ideally) a geoscience MSc degree.

**Award:**

This project is funded by iCRAG, the SFI Research Centre in Applied Geosciences. The successful candidate will be enrolled for a 48-month (Structured) PhD programme at University College Dublin, Ireland. The studentship provides university tuition fees and an annual tax-free stipend of €18,500 over four years. Funds for project costs are also available.

**Start date:**

The projected start date is on the 1<sup>st</sup> of September 2022, or as soon as possible thereafter (with a latest start date on the 1<sup>st</sup> of January 2023).

**Further information:**

*For further information please contact Dr Weimu Xu (Email: [weimu.xu1@ucd.ie](mailto:weimu.xu1@ucd.ie)).*

**Application procedure:**

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, and (3) the names and contact details of two academic referees, to **Dr Weimu Xu** ([weimu.xu1@ucd.ie](mailto:weimu.xu1@ucd.ie)).

**Closing date:**

The closing date for applications is **12<sup>th</sup> of August 2022, at 5pm (local) Irish time.**