

## Research Experience Placement (REP) Scheme Project

**Project Supervisors:**

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**Host Organization and Department (if applicable):**

Department of Geography, Durham University

**Project Title:**

**Reconstructing past sea-level change in the Windmill Islands, East Antarctica.**

**Project Description:**

There is significant uncertainty regarding East Antarctica's contribution to sea level change; largely due to uncertainty in satellite measurements of ice loss associated with glacial isostatic adjustment (GIA). One of the largest uncertainties in East Antarctic GIA is within the Australian Antarctic Territory where models disagree on the magnitude of current uplift and/or subsidence. One approach to reducing this uncertainty is by developing accurate reconstructions of past relative sea-level (RSL) change which is directly related to 1) the rate of global (eustatic) sea level change, and, crucially, 2) local isostatic uplift.

A recent Antarctic field program collected sediment cores from lakes in the Windmill Islands, East Antarctica. The Windmill Islands are a rare ice free area in East Antarctica and thus they provide a unique opportunity to obtain geological data to constrain past sea level change. The sampled lakes are located below the highest post-glacial sea-level and are thus ideal candidates for reconstructing past changes in RSL using the isolation basin approach (e.g. Roberts et al., 2011). The aim of this project is to identify the marine/freshwater transition(s) within the lake sediments using a multi-proxy approach including geological and micro-palaeontological methods. This project contributes to a larger, international effort to constrain GIA in East Antarctica. The project objectives are:

1. Describe the core sedimentology and lithology.
2. Sub-sample and prepare slides for diatom identification (and potentially other methods).
3. Identify marine-freshwater transitions and produce an initial relative sea-level curve for the Windmill Islands.

**Skills and Career-Development Opportunities:**

The student will gain a range of skills and experience in this placement. Crucially, they will be exposed throughout to an active research environment with a focus on polar science. This will include participation in research group meetings with Durham staff and postgraduate students as well as with international partners in Germany and Australia; along with discussions of data interpretation, publication etc such that they get a feel for much of the research process.

They will be taught a range of technical skills including but not limited to: core analysis; grain size analysis; preparation for microfossil analysis; microscope analysis of microfossils; data interpretation; relative sea level and glacial isostatic adjustment processes and background.

This range of skills will be good preparation for applying to PhDs and other careers in geoscience, both within and beyond polar science. Polar science has a particular issue with diversity, as recently acknowledged by the UK-wide Diversity in Polar Science initiative (at which Durham staff have spoken and participated) and the Polar Horizons schemes where aspirant polar researchers are mentored by established researchers, and where a range of Durham staff are taking part.

As part of the placement we would anticipate including some bespoke conversations around careers in geoscience and polar science. We will explore the successful applicant's interests and mentor them through any questions they have, the next steps in career development, and we would anticipate ensuring we remain available as needed by the candidate for advice on future applications, reference requests, and future mentoring.

**Wider context of research:**

The student will undertake primary data collection through laboratory work and analysis. They will be trained in the process of describing and sub-sampling sediment cores. There is scope for a variety of further analysis and the student will be encouraged to decide on the most appropriate methodologies. The results will contribute to an ongoing project to constrain East Antarctic GIA involving international collaborations in Australia and Germany. During the placement the student will be involved in project meetings with these international collaborators to discuss the work. Additionally, Durham hosts a large number of Antarctic facing researchers and we have regular Antarctic focussed meetings where people can present and discuss work in an informal and supportive setting.

**Project Timeframe:**

We are flexible on timing. We anticipate the work outlined would take about 8 weeks and we would ensure that the timing and duration coincide with core cohort-based activities over the summer. Our understanding is that July-August works best and we would happily accommodate that timing, subject to flexibility to the availability of a successful applicant.