**PhD studentship Project information**

**Funding Source:** CENTA DTP

**Proposed start date:** 25th September 2023

**Closing date for applications:** 11th January 2023

**Eligibility:** UK/International

**Department/School:** SGGE

**Supervisors:** **PI:** Dr Tiffany Barry(University of Leicester) tlb2@le.ac.uk

**Co-I:** Dr Catherine Greenfield (cg331@le.ac.uk)

**Co-I:** Dr Dan Smith (University of Leicester) djs40@le.ac.uk

**Project Title:** Relating changes in melt genesis to dynamic conditions of the demise of a continental arc: Antarctic Peninsula arc

**Project Description :**

**Project Highlights:**

* Geochemical transect through a little known continental arc
* Builds on the legacy collections of the British Antarctic Survey
* Develop a wide range of analytical geochemical skills
* Link geochemical variability to plate reorganisations and magmatic flare-ups using 3D mantle modelling

**Overview:**

The poorly understood Antarctic Peninsula volcanic arc was an active continental margin between the Early Late Jurassic and the Early Miocene. Although many expeditions have visited parts of the arc, and the northern end of the arc has been well-studied, there are vast tracts of the arc for which there are either no geochronological constraints or geochemical investigations of the arc development. A recent study of the available data (Leat and Riley, 2018) found four chemically distinct volcanic groups within the arc: calc-alkaline, high-Mg andesites, adakites and a peralkaline high-Zr group. However, few constraints between the groups are known, including their timing within arc development and their relation to each other, and what their significance was to the changing margin dynamics of the time. The Leat and Riley (2018) study has highlighted the perhaps unusual feature of numerous high-Mg andesites within the arc, but the significance of this is uncertain due to a lack of geochronological controls. A migration of the arc toward the trench is indicated to have occurred during the Cretaceous, but is also very poorly constrained due to the lack of age data. New isotopic ages will constrain the changing melt conditions along and across the arc and will be linked into the development of geodynamic models for the area.

This project will take advantage of the exceptional collection of samples held by the British Antarctic Survey and access to it through BAS scientist Dr Riley. Furthermore, the link between UoL and BAS will be enhanced by two honorary Leicester scientists Drs Leat and Smellie who have formerly been BAS-scientists and whom collected many of the legacy samples. The aim of this project will be to learn how the high-Mg andesites and adakites fit into the development of the Antarctic Peninsula arc, what the controls their genesis, and what this tells us about the changing conditions of melt production along the Antarctic Peninsula arc during its life cycle of development and demise.

The project will suit a student interested in geochemistry and geochronology, taking apart a poorly explored region, and with a keen interest in petrogenesis and arc magmatism.

 (a) 

Figure 1. Columnar jointed Cretaceous arc volcanic rocks from Central Palmer Land

**Methodology:**

The student will work with Drs Leat, Smellie and Riley to assess the legacy sample archive. This will involve sample characterisation and compilation of their current data. With selected samples, the student will: (1) date the samples using the technique best suited for the rock (either U/Pb or Ar-Ar dating); and (2) geochemically characterise the samples using whole rock XRF, ICP-MS, and radiogenic isotopes (Sr-Nd-Pb-Hf). The student will receive full training in these techniques and be taught how to run the samples for themselves, where possible. The data will be used to build up a geodynamic model of the development and demise of the arc which previously has not been possible due to the lack of age constraints. Constraints will then be used to build 3D numerical models to look at the links between plate dynamics and melt genesis. This will be the first study to examine the arc evolution, and the student will be expected to compare the arc development with other well-characterised arcs such as the Trans-Mexican volcanic belt and the Chilean arc. Although there is no fieldwork to Antarctica planned, fieldtrips will be arranged to other global arcs, for example to Chile, to examine analogous settings.

The student will join a well established research group in the University of Leicester in geochemistry and petrogenesis.

**References:**

* Leat, P.T. and Riley, T.R. Antarctic Peninsula & South Shetland Islands: volcanology, 2021. In: Smellie, J., Panter, K. and Geyer, A (Eds.) Volcanism in Antarctica: 200 Million Years of Subduction, Rifting and Continental Break-Up. Geological Society, London, Memoirs, 55, 185 - 212.
* Leat, P.T. and Riley, T.R. Antarctic Peninsula & South Shetland Islands: petrology, 2021. In: Smellie, J., Panter, K. and Geyer, A (Eds.) Volcanism in Antarctica: 200 Million Years of Subduction, Rifting and Continental Break-Up. Geological Society, London, Memoirs, 55, 213 - 226.

**Funding details:**

NERC CENTA studentships are for 3.5 years and are funded by NERC. In addition to the full payment of your tuition fees, you will receive the following financial support:

* Annual stipend, currently set at £ 17,668 (2022/3 – new figures to be confirmed spring 2023)
* Research training support grant £8,000 (RTSG)

\* If you do not meet the criteria for UK Fees you will need to fund the difference between UK and International fees for the duration of your studies.

\* A limited number of top up studentships to fund the difference between UK and International fees may become available but are not guaranteed.

For more details of the CENTA consortium please see the CENTA website: [www.centa.org.uk](http://www.centa.org.uk) .

**Entry requirements:**

Applicants are required to hold/or expect to obtain a UK Bachelor Degree 2:1 or better in a relevant subject or overseas equivalent.

The University of Leicester [English language](https://le.ac.uk/study/research-degrees/entry-reqs/eng-lang-reqs) requirements apply where applicable.

**Application advice:**

To apply please refer to

<https://le.ac.uk/study/research-degrees/funded-opportunities/centa-phd-studentships>

With your application, please include:

* CENTA Application form - available to download on the How to Apply section of the above link
* CV
* Personal statement explaining your interest in the project, your experience and why we should consider you
* Degree Certificates and Transcripts of study already completed and if possible transcript to date of study currently being undertaken
* Evidence of English language proficiency if applicable
* In the reference section please enter the contact details of your two academic referees in the boxes provided or upload letters of reference if already available.

In the funding section please specify that you wish to be considered for Ref CENTA2-SGGE8-BARR

In the proposal section please provide the name of the supervisors and project title (a proposal is not required)

**Project / Funding Enquiries to:** **CENTA@le.ac.uk** **or** tlb2@le.ac.uk

**Application enquiries to** **pgradmissions@le.ac.uk**