

### *Proposed Research*

Volcanic systems can have a controlling impact on the environment in which they erupt. Developing an understanding of such systems necessarily begins with constraining the evolution of the magma that eventually leads to eruption. For most volcanic systems on the African continent, there is a lack of such data and thus there is an opportunity to explore magma origin and evolution within such environments. This project will utilize microbeam techniques on volcanic products to develop an understanding of what processes impacted the evolution of a system that is chosen by the Mentee in consultation with the host collaborator and Prof. Rooney. Two possible avenues of research are envisaged. Firstly – the mentee may select a volcanic system within the study areas currently under investigation by Prof. Rooney. These regions encompass Kenya and Ethiopia. However, expansion to any other part of the East African Rift would be possible. Secondly – the mentee may select a volcanic system of their own choosing. In this case, the Mentee would discuss the volcanic system with the host collaborator and Prof. Rooney to establish a field sampling plan that would fulfil the goal of establishing the magma origin and evolution within that system. In both cases a degree of thought leadership is anticipated wherein the Mentee would drive the research question based upon the specific magmatic system selected. The outcome of this project is a geochemical dataset that would characterize the magmatic evolution of the system selected.

### *AAP Priority Area – Water, Energy, and Environment*

This project addresses the focus area of Water, Energy, and Environment. The primary focus of the project is the characterization of a magmatic (volcanic) system whose selection is led by the mentee and host collaborator. Volcanic systems can control all three of these variables – the chemical composition of surface (e.g. sodic lakes) and groundwater (fluorine concentration) is can be controlled by volcanic systems. Moreover, these systems are currently being exploited for energy in Ethiopia and Kenya. Volcanic systems on the African continent are profoundly underexplored – the fundamental research proposed here could have potential to be utilized more practically in these areas.

### *Grant proposal writing work*

The mentee will work with Prof. Rooney and host collaborator to construct a US National Science Foundation grant proposal. This proposal will utilize the data generated by the mentee and expand the scope to a multi-year project. As part of this process, the mentee will be involved in all stages of grant preparation from conceptual frameworks, logistical planning, and budgets.

### *Publications*

The mentee is expected to take the lead authorship on at least one manuscript to be submitted during their time in the program. This manuscript will be written in conjunction with input from Prof. Rooney and the host collaborator. The manuscript will be submitted to a top-tier international journal. Mentee will be provided guidance on manuscript construction, argument construction, and data presentation.

### *Specific activities*

In addition to the writing work outlined above, the following activities are anticipated by the mentee: (A) Field work may be needed for sample collection depending on the project selected, (B) Sample preparation within our labs; (C) Sample analysis using x-ray fluorescence techniques, scanning electron microscopy, optical petrology, and laser ablation inductively coupled plasma mass spectrometry; (D) Data processing; (E) Data interpretation in conjunction with Prof. Rooney and host collaborator; (F) Mentorship of an undergraduate researcher in a related project. Mentee will assist undergraduate student in applying for internal research funding and coordinate the project.