Explosive basaltic volcanism in the Ethiopian rift

As an Earth Scientist, I am interested in the generation and development of rifting regions and igneous provinces, modelling magmatic settings, and the petrogenesis of igneous and metamorphic rocks. I am therefore applying to the project 'Explosive basaltic volcanism in the Ethiopian rift'.

This project is appealing to me, as it permits me to apply my experience in petrological modelling and geochemical analysis to an actively rifting region. In my undergraduate study I have considered how surface products are related to melt generation and storage at depth, for example by considering how trace elements in olivine are affected during mantle transport (masters project), and questioning whether ophiolite lithologies are representative of crustal processes at mid-ocean ridges (mapping project). I am very interested in learning more within this area. The combination of igneous petrology and geochemistry that this project involves will reinforce my knowledge from undergraduate study and allow me to explore new techniques and develop skills that will improve my ability as a researcher.

I am also drawn to this project by the experienced staff of the SEE at Leeds and the Department of Earth Sciences at Cambridge. Involvement with two strong departments will offer many opportunities during the project, both through stimulating discussion with academics who have done research on rift volcanism and igneous petrology, and through training and use of analytical equipment. I am also keen on collaborating with various research groups and COMET over the course of the project, as discussion and input from different researchers will allow the project to flourish.

Finally, the prospect of interaction with RiftVolc is especially exciting to me given my interests and background. As I am aiming to continue in academia after my PhD, the connections I make during this project will be crucial when taking the next step into postdoctoral research.

I am a suitable candidate for this program for several reasons. I am very passionate about igneous petrology, and have dedicated much of my degree to studying igneous settings and processes. As an example, I undertook my undergraduate mapping project in Northern Greece, at the contact between the Pindos ophiolite and the Mesohellenic basin. The region has been heavily deformed both during and after ophiolitic obduction; however, the upper crustal sequence is still well preserved. This project both tested and improved my petrographic description in the field, earning me the CASP Notebook Prize for best mapping notebook. I am currently writing up this project in preparation for publication by the Geological Society of Greece.

Over the summer I improved my fieldwork skills further as a fieldwork assistant in Iceland with John Maclennan, sampling basaltic glasses, picrites, and magma chamber aggregates of Icelandic eruptions. Although the samples collected did not contribute to my own research, I gained valuable fieldwork experience in a region of the world defined by igneous processes.

My masters project addresses some of the difficulties in past Hawaiian mantle potential temperature estimates, and uses the crystallisation temperature of olivine as a new constraint. The use of the Al-in-olivine thermometer for both Hawaiian and MORB olivines indicates that Hawaiian melts have a higher liquidus temperature than ambient mantle melts. A mantle melting model I coded based on literature parameterisations then allows an indirect translation between olivine crystallisation temperature and mantle potential temperature. I hope to bring this experience with mantle melt modelling, olivine electron probe microanalysis, and Al-in-olivine thermometry to use in this project.