

Christine Burrill
Geosciences Alumni Award – 2016
Microprobe and LA-ICP-MS Analysis of samples from the Atascosa Lookout Lava Flow
Summary of Research and Travel

The goal of this project is to be able to calculate the pressure and temperature at which minerals crystallized and grew in the Atascosa Lookout Lava Flow from southern Arizona. In order to do this, I went to the University of New Hampshire to use their Laser Ablation Inductively Coupled Mass Spectrometer. I was scheduled to use the equipment July 28, 2016 but due to technical issues was unable to use it until October 6, 2016. The laser drills very tiny holes into the sample, which were just regular thin sections of the rocks, and I was able to analyze for trace elements. The samples were marked beforehand for minerals of interest, taking into account beam size, using a petrographic microscope. I had to choose minerals that were bigger than the diameter of the beam and also were mostly intact and not resorbed or partially dissolved. Plagioclase, hornblende and clinopyroxene are the minerals of interest that can give the information I am looking for to generate a model for the subsurface history of this lava flow. I ran 12 thin sections for a total of about 150 spots. Though preparation is done beforehand to choose minerals, it can be difficult to see them on the video. Once spots are chosen, they have to alternate with spots on standards. Setup took about 1-2 hours and before each run was performed the lab director would adjust the magnet and the laser beam. The machine would then run for 1-2 hours collecting the data.

The data has to be processed on site using a specific software called Iolite at the lab. Noise between the peaks were manually filtered and the data normalized to calcium. The calcium value for each of the minerals in this lava flow was determined by previous work by Sheila Seaman. Data will be used to look at Rare Earth Element plots and calculate the original composition of the magma. Additionally the data from the hornblende and clinopyroxene will be used to calculate pressure (depth) and temperature histories of the lava flow.

