Christine Burrill

Leo M. Hall Memorial Fund Award – 2015

Microprobe Analysis of Precambrian Volcanics North of Boston Massachusetts

Summary of Research and Travel

I spent 3-5 consecutive days at a time each week for two months in the Lynn Woods Reservation during the summer of 2015. I would camp at the Lorraine Campground at Harold Parker State forest just north of the field area. There wound up being so many volcanic outcrops in the Lynn Woods to map and sample that I didn't go to the other two Reservations. One day, Lindley Hanson met with Sheila Seaman and I and we went to specific locations of interest around the park. Lindley is mapping the entire Reservation and she was able to help point me to areas she had already recognized as contacts between the volcanics and granites. This saved me a lot of time avoiding areas that were just granite. I spent a day towards the end of the summer at Castle Rock on Marblehead in Massachusetts because the rocks there are recorded as Lynn Volcanics yet no geochemistry had been done to prove this. I collected only samples on the ground or loose fragments that were coming off the face because erosion from the ocean is eating away at these rocks rapidly. The volcanics look very similar in outcrop in both locations. Many locations show very interesting mingling of 2 or 3 different types of magma (see photo below). No layering or orientation indicator could be found in the Lynn Woods but layering was present at Castle Rock. I collected samples from the tunnel under Dungeon Rock in the Lynn Woods at varying depths to see what differences there might be. Other samples had chunks of granite in them (ripped up from the basement/country rock) which will be important for establishing the stratigraphy. The rocks will be analyzed and my goal is to publish the results because there are a number of people, such as Lindley, who could use the geochemical data on these rocks to incorporate into their own research. I plan to slab and characterize the samples, make thin sections for characterizing samples with a petrographic microscope and using the XRF to get major, minor and trace element analysis. Then I plan to put the data into an interactive map where I can spot certain geochemical trends spatially. I then will use my thin sections for the microprobe to analyze specific minerals to establish more specific conditions on the magma system and the eruption of these volcanics.