

PRF# 58805-ND2

Project Title: Investigation of Sulfur Transformations Associated with Magma Emplacement in Organic-Rich Sedimentary Rocks

Principal Investigator: Benjamin Gill, Virginia Tech

Co-PI: Mark Caddick, Virginia Tech

In spring of 2018 we had difficulty recruiting a student to participate in this research project and therefore did not have a student ready to work on project for the start date of the grant in August of 2018. However, in January of 2019 we identified and successfully recruited a PhD student, Jonathan (Jonny) Prouty, who started on the project in May of 2019. Because of this delay, we will be asking for an extension on the grant past the proposed end date.

From May 2019 until the end of the report date there have been several major accomplishments on the field work and laboratory portions of the project. In regards to the field work, Jonny further researched then and scouted several study locations on the east coast of the United States and Canada where igneous bodies of the Central Atlantic Magmatic Province (CAMP) intruded organic-rich sedimentary rocks. This includes sites in the Culpepper Basin of Virginia, the Gettysburg Basin of Pennsylvania, and the Fundy Basin of Nova Scotia. Part of these scouting trips included the collection of pilot samples taken at increasing distance from the intrusive bodies at a coarse sampling resolution. These samples are presently being analyzed in the lab this fall for their carbon and sulfur contents. When this pilot geochemical data set is completed, we plan to determine which sites we will revisit in the spring of 2020. The pilot data will also be used to identify zones in the sedimentary rocks where there were losses or additions of carbon and sulfur to the rocks. We will sample these zones at higher resolution when we revisit the sites.

In the laboratory this summer, Jonny has been working with the technician that oversees the secondary ionization mass spectrometer (SIMS) to prepare a sample set we have in house from the Culpepper Basin for in situ sulfur isotope analyses of the sulfide phases in these rocks. These samples were collected by a former graduate student as part of her Masters project. These analyses will be conducted this winter. Jonny has also taken the Microscope Energy-dispersive X-ray spectroscopy (EDS) analyses taken by the former graduate student on the thin sections of Culpepper samples. He has written an algorithm to compile and statistically evaluate these analyses and is currently comparing these results to the petrographic observations and geochemical analyses previously made on these thin sections.