Ladd NSF GRFP Activities Report for Tenure Year 2016

In the past year, I have advanced to candidacy in the Energy Science & Engineering interdisciplinary PhD program at the University of Tennessee (UTK) and have made significant strides on my dissertation work. Alongside my scientific research, I have been able to more formally pursue my interests in public policy and science communication while continuing to be an advocate for underrepresented minorities in STEM fields, with the support of my adviser at Oak Ridge National Lab (ORNL), Dr. Bob Hettich, and of my program through the Bredesen Center.

Intellectual Merit

After developing an optimized high-resolution nano-liquid chromatography mass spectrometry approach for the characterization of small molecules in soil pore water, I presented the results of that work at the American Society for Mass Spectrometry Meeting (ASMS) in San Antonio, TX last June and the Annual Meeting of the American Geophysical Union (AGU) in December. I then applied this technique to characterize organic matter in soils I obtained from a field site on the northern coastal plain of Alaska as part of the Department of Energy's Next-Generation Ecosystem Experiments (NGEE) project. Arctic permafrost soils contain nearly twice as much carbon as that which exists in the atmosphere. With warming temperatures, it's been predicted that organic matter that was previously frozen and unavailable for decomposition, would become available to soil microbial communities, increasing their activity and ultimately the loss of carbon from these systems in the form of greenhouse gases (GHG) such as carbon dioxide (CO_2) and methane (CH_4). Predicting where and when this will occur across the landscape is challenging however and relies on many factors, including the inherent chemistry, or "biodegradability", of the organic matter. By analyzing the chemical composition of dissolved organic compounds in soil, and correlating that with ancillary data such as GHG release and microbial community measurements, we aim to identify "hotspots" of biogeochemical activity indicating areas that may be more vulnerable to warming temperatures. In the next year, I will complete one final field campaign on the Seward Peninsula of Alaska, will present the results of these projects at the ASMS and AGU meetings, and am currently completing a manuscript on this work to be submitted to a peer-reviewed publication this year.

I was also able to more formally develop my interdisciplinary experience when I was accepted to attend the American Association for Advancement of Science (AAAS) Catalyzing Advocacy in Science and Engineering (CASE) Workshop and the PLEN Network's Global Policy Workshop in D.C. this spring. While at these workshops, I attended congressional hearings and seminars about the federal funding of research and development activities in the U.S. and met with congress members and staffers from relevant appropriations, science, and foreign relations committees and departments where I learned about potential career paths at the interface of science and policy.

Broader Impacts

As an advocate for women and minorities in STEM, and for more effective communication between scientists and the public, I have continued to participate in activities and events that help further these goals. Last fall, I was invited to participate in the Alan Alda Science Communication Workshop at ORNL and for the third year in a row, I have led a team of students at UTK to design and organize a Women in STEM Research Symposium (http://cfwstem.weebly.com). I continue to share my research and advice about graduate school and the NSF GRFP application process via my website and blog *Think Like a Postdoc*, and gave talks this year about my research to audiences of K-12 students, a class of retired (age 65+) Knoxville community members, and fellow graduate students in STEM fields.