☐ **Talk** ☒ **Poster**

Controls on manganese oxidation in natural and fire-disturbed ecosystems

Shyrill Mae Mariano[1], Rixiang Huang[1]

[1] Department of Environmental and Sustainable Engineering, College of Nanotechnology, Science, and Engineering, State University of New York at Albany
Author Email: smariano@albany.edu

The redox cycling of Mn, driven by microbial activity, is a key process in organic matter decomposition and nutrient cycling. However, disturbances such as fires have the potential to transform Mn pools and speciation at much faster rates, thus suggesting a change in Mn cycling pathways. Understanding on how natural processes and disturbances control Mn cycling is still not clearly understood. In our recent works, we characterized Mn chemistry (concentration, oxidation state, and speciation) of (1) a temperate pine barrens profile overlain by different types of vegetation and (2) fire residues from laboratory heating and wildland fires across varying ecosystems through inductively coupled plasma optical emission spectroscopy (ICP-OES), X-ray absorption near edge spectroscopy (XANES), and extended X-ray absorption fine structure (EXAFS) analyses. The vertical variation of Mn concentrations of the unburnt soil profile is controlled by vegetation type and soil retention capacity, whereas oxidation state reflected microbe-driven Mn redox cycling. Mn AOS of fire residues show complete oxidation of Mn in laboratory heating (550 ℃ for 5-6 h) and variable oxidation states (2.6 to 3.3) for wildland fire residues. Decay litter and laboratory heated vegetation with high degree of oxidation (3.5 to 4.0) exhibited distinct Mn speciation. Our results showed that burning conditions (duration and temperature) and initial chemistry control the resulting Mn species, suggesting different pathways for post-fire soil processes coupled with Mn.