**Wildfire effects on belowground carbon and nitrogen cycling and microbial biomass in the Sierra Nevada

Presenter's Name:** Mary Brady
**Presenter's Company/Employer:** University of Nevada, Reno
**Topic:** Managing fire regimes in a changing world (good fire/bad fire)
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 **Abstract:**Coauthors: Erin Hanan, Jessica Miesel, Matthew Dickinson, Jonathan Greenberg, Carol Ewell, Laura Wade Fire is a key factor regulating carbon (C) and nitrogen (N) retention in soils of the Sierra Nevada. As fire regimes shift in response to climate change and management, it is vital to understand how belowground C and N cycling will respond. However, studying fire is challenging. Fire timing and location are difficult to predict and as a result, researchers must often rely on space-for-time substitutions to evaluate fire effects. Unfortunately, these substitutions make teasing apart fire effects from other drivers challenging. To eliminate such problems, many studies have focused on prescribed fire, which enables researchers to conduct pre- and post-fire measurements at a known location. However, prescribed fires differ from unplanned fires (hereafter called wildfires) in their severity, heterogeneity, and spatial scale. Thus, to understand the effects of wildfire on soils, we need to incorporate location specific pre- and post-fire sampling. Here, we collected soil samples in the path of advancing wildfires in the Sierra Nevada and then resampled the sites immediately post-fire, one month, and six months later. Additionally, because some of our sampling sites did not burn, we were able to examine the role of wildfire alongside seasonal processes that influence soil dynamics. We analyzed the forest floor and mineral soil for N mineralization and nitrification rates, pH, microbial biomass, and total C and N. Preliminary results show pronounced spikes in pH following fire for both mineral soil and forest floor. The magnitude of these spikes increased with fire severity and were larger in the forest floor than in mineral soil (i.e., 4 and 0.7 pH unit increases, respectively, in the high severity plot). Our results also suggest that microbial responses vary with fire severity: microbial biomass was higher in mineral soils that burned at high severity while plots that burned at low severity had similar mineral soil microbial biomass to unburned plots one month post fire. Forest floor microbial biomass however, was lowest in the high severity fire plots. Preliminary results also indicate different biomass response to spring thawing with larger increases in areas that did not burn. Our current work seeks to link soil temperature measurements from wildfires with belowground biogeochemical fluxes to quantify the effects of fire energy. These measurements are crucial for projecting how carbon and nitrogen retention will respond to future fire and climate conditions.