## **Defense announcement**

The role of erosion in soil organic matter and pyrogenic carbon dynamics in fire-prone temperate forests



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## Abstract

Wildfire and erosion are major perturbations to the carbon cycle in eroding Sierra Nevada temperate forest landscapes. Pyrogenic carbon (PyC) is formed due to incomplete combustion during fires, and is an important component of the soil carbon sink due its relatively longer turnover times in soil and susceptibility to erosion forces. Erosion of PyC and other soil organic matter fractions was monitored after two wildfires: the Gondola Fire, South Lake Tahoe and the Rim Fire, Yosemite National Park. Significant and preferential erosion of PyC was found after the fires, in addition to leaching down into the soil profile. The preferential erosion of PyC, and overall quality of the soil and eroded sediments were controlled by burn severity. To assess the fate of PyC in eroding and depositional landform positions, chars formed at different temperatures were incubated in the same soil collected from different landform positions. Both charring temperature and landform position played significant roles in controlling soil respiration, with the lower charring temperatures and the soil from the depositional landform position having much higher respiration than higher temperature chars and the soil from the eroding landform position. The post-fire erosional transport of PvC can act as a major control on its long-term fate in soil. By modeling the difference between including eroding and depositional landform positions in PyC decay models, this can introduce error in measured turnover times of up to 150 years. Including erosion as a mechanism for loss and gain of PyC in eroding and depositional landform positions, respectively, is critical for accurate accounting of PyC within the soil cycle. Understanding the controls of erosion of PyC allows land managers to mitigate erosional loss to enhance soil carbon storage.

## Biography

Rebecca graduated with a Joint Honours Bachelor's of Science in Environmental Biology and Physical Geography from St. Andrews in Scottland. While studying there, she worked on research projects on the impacts of land use and land use change on soil carbon cycling through a transect in the Peruvian Andes. Her current research focuses on the interactive roles that fire and erosion play as controls on soil carbon cycling. Her projects include working on the Gondola Fire, near South Lake Tahoe and the Rim Fire in Yosemite National Park. While studying at UC Merced, Rebecca has given talks on her work at the American Geophysical Union annual meeting in both 2015 and 2016, in addition to a Critical Zone Observatory conference.