3rd INTERNATIONAL CONGRESS ON ENGINEERING AND LIFE SCIENCE
ICELIS 20-22 SEPTEMBER 2023 TRABZON-TURKIYE

ORAL PRESENTATION https://doi.org/10.61326/icelis.2023.42

Winter Soil Respiration, Temperature, and Soil Moisture in Snow-Manipulated Postfire and Undisturbed Black Pine Forests in Taşköprü, Kastamonu District, Türkiye

Renato S. Pacaldo[1,2]✉, Miraç Aydın[1], Randell Keith Amarille[1,2]

[1]Kastamonu University, Faculty of Forestry, Kastamonu/TÜRKİYE

[2]Mindanao State University-Main Campus, College of Forestry and Environmental Studies, Department of Forestry, Marawi City, Lanao del Sur/PHILIPPINES

✉***Correspondence**:* renato.pacaldo@msumain.edu.ph

Abstract: Climate change has been fueling forest fires worldwide and driving warmer winters in temperate countries. Recently, wildfires devastated large track of forest lands in Canada and Hawaii, resulting in the unfortunate loss of lives and properties. A warmer climate forecast not only increases the occurrence of forest fires but also brings about a snow-free warm winter season. Given these consequences of a warmer climate, a critical question is whether these climate change-related impacts significantly enhance soil respiration (R_s) in forest fire areas and standing undisturbed forest ecosystems. We conducted a field experiment in one of the recently burned black pine forest (*Pinus nigra* Arnold). We employed an automated soil respiration machinery (Li-8100A, LiCor BioSciences) to measure the soil CO_2 emissions, soil temperature, air temperature, and soil moisture simultaneously. We found that a warmer winter results in higher soil respiration rates and warmer soil temperatures in undisturbed forests, indicating its less sensitivity to snow cover. In contrast, the snow-free post-fire treatment exhibited significantly reduced soil respiration rates and freezing soil temperature at the height of the winter season. We concluded that the complementary effects of lack of snow and forest fire resulted in a significant decrease in soil respiration rates, and, thus, potentially resulted in the conservation of soil C stocks during the winter period. The higher soil respiration and warmer soil in the undisturbed forest could accelerate the decomposition of soil organic matter and increase the contribution to atmospheric CO_2, thus providing positive feedback to climate change. Given the global concerns about climate change impacts and the frequency of forest fires, the findings of this study would help us understand the impacts of forest fires and lack of snow in climate-soil respiration feedback.

Keywords: Climate change, Forest fire, Warm winter, Snow-free, Carbon dioxide.