Title:
Climate change impact on soil microbial carbon utilization across different biomes

Authors:
Aline Frossard1, Xingguo Han1, Jonathan Donhauser2, Jeremy Cook1, Verena Koppe1, Seraina Nohl1, Matthias Saurer1, Joan Pere Casa-Ruiz2, Karen Jordaan3, Anders Priemié2, Jean-Baptiste Ramond4,5, Anna Romani2

Institution(s):
1Swiss Federal Research Institute WSL (CH), 2University of Copenhagen (DK), 3University of Girona (SP), 4University of Pretoria (SA), 5Pontifica Universidad Católica de Chile (CL)

Abstract (300 words maximum): :
There is a considerable socio-economic interest in predicting how the C balance of ecosystems will respond to ongoing and future global changes, however, the incorporation of microbially-derived components into the stable soil C pool and soil microbial processes feedback on climate are far from being fully understood. A common garden experiment was performed to decipher short-term effects of climate change on microbial respiration, biomass and carbon use efficiency of soils from different biomes. Surface soils from Arctic tundra (Greenland), Boreal (Sweden), Temperate (Switzerland) and Mediterranean (Spain) forests, and Desert (Southern Spain) sites were incubated and were subjected to treatments combining elevated temperature and soil moisture, simulating a summer drought followed by a rewetting storm. Increase of temperature had generally very little effect on microbial biomass carbon (MBC) and nitrogen (MBN) and microbial Carbon Use Efficiency (CUE) of the different soils. Summer elevated temperatures decrease CUE during drought in all biomes except the Arctic. CUE generally increased in all biomes after rewetting, more rapidly in some biomes than in others. Moreover, MBC increased upon rewetting in all biomes except the Desert implying a drought adaptation of the microbial communities in this soil. Altogether, our results show that soils from different biomes respond differently to drought and rewetting in term of carbon utilization. Using a workflow that integrates CUE and quantitative Stable Isotope Probing (qSIP), we will further unravel microbial carbon pathways and active community diversity, providing insights into soil carbon processing under climate change.