Geophysical Research Abstracts
Vol. 21, EGU2019-7912, 2019
EGU General Assembly 2019

Enhanced microbial growth and turnover drive increases in soil organic carbon storage at higher plant diversity.

Judith Prommer (1), Wolfgang Wanek (1), Tom Walker (1,2), Judith Braun (1,3), David Zezula (1), Yuntao Hu (1,4), Florian Hofhansl (5), Andreas Richter (1,5)

(1) Department of Microbiology and Ecosystem Science, University of Vienna, Vienna, Austria (judith.prommer@univie.ac.at), (2) Department of Ecology and Evolution, Université de Lausanne, Lausanne, Switzerland, (3) The Scottish Association for Marine Science, Oban, UK, (4) Lawrence Berkeley National Laboratory, Berkeley, USA, (5) International Institute for Applied Systems Analysis, Laxenburg, Austria

Plant diversity promoted plant productivity and increased soil organic carbon (SOC) storage in the few long-running plant biodiversity experiments, including the Jena Experiment. While the importance of soil microorganisms for the conversion of plant litter into SOC is undisputed, the response of microbial community physiology to higher plant species richness (PSR) has remained elusive. Given the widely found energy and/or carbon limitation of heterotrophic soil microbial communities, it is important to understand how microbes respond to increased plant derived carbon inputs at higher PSR levels and how this may promote SOC accumulation. We here demonstrate, by direct measurements of microbial growth, respiration and carbon use efficiency (CUE) that enhanced soil microbial growth and turnover is the key to explain SOC build-up in more diverse plant communities. Increased microbial growth and accelerated microbial biomass turnover led to higher amounts of microbial biomass and necromass that in turn enhanced the SOC pool. In contrast, microbial CUE and mass-specific respiration rates did not respond to manipulations in plant diversity. We thus highlight that enhanced plant productivity at high plant diversity favored microbial growth and turnover thereby promoting SOC storage.