



Back

Contributed Talk

Session: : Biogeochemistry: C And N Cycling In Response To Global Change 3

COS 163-3 - Does elevated CO₂ alter the way microbes behave underground?

Wednesday, August 9, 2023 10:30 AM – 10:45 AM PDT Location: B115

Presenting Author(s)



Nahuel Policelli

NP

Boston University Department of Biology, Argentina

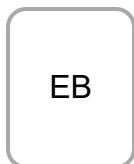
Coauthor(s)



Colin Averill

CA

ETH Zürich, Switzerland



Edward R. Brzostek

EB

Department of Biology, West Virginia University, West Virginia, United States



Haihua Wang

HW

University of Florida, United States



Hui-Ling Liao

HL

University of Florida, United States



Vijay Verma

VV

University of Florida, United States

Ryan Tappero

RT

Brookhaven National Laboratory, United States

Corinne Vietorisz

CV

Boston University Department of Biology, United States

Jake Nash

JN

PhD Candidate
Duke University, United States**Rytas Vilgalys**

RV

Duke University, United States

Jennifer M. Bhatnagar

JB

Associate Professor of Biology
Boston University Department of Biology, United States

Abstract: Increase in carbon (C) emissions due to human activity is a major cause of global change, but it is unclear how trees obtain soil nutrients to sustain growth under these conditions. To better understand how root symbiotic fungi (ectomycorrhizal fungi, EMF) will react to an increase in atmospheric CO₂ we've simulated such scenario using synthetic ecosystems where pine trees were planted with and without their EMF (*Suillus cothurnatus*), nitrogen (N), and soil carbon (C) additions, in elevated vs ambient CO₂ growth chambers. By combining biogeochemical analysis with differential isotopic signatures of soil vs plant C, and a series of -omic approaches, we captured changes in soil nutrients, soil respiration, and microbial composition and activity. We found that elevated CO₂ did not lead to a change in free living fungal community composition compared to ambient CO₂. However, under elevated CO₂, more gene modules of *S. cothurnatus* involved in C-N degradation pathways were impacted by soil C and N additions. In turn, under elevated CO₂ and when the EMF was present, we found high enrichment of non-targeted metabolites. The release of CO₂ from soil was highly dependent on soil C and N availability and shifted depending on plant C availability. Our results inform ecosystem models by showing that interactions between free living fungi and EMF are an important mechanism for determining ecosystem responses to elevated CO₂. In turn, our results challenge the classic perspective that EMF solely absorb nutrients and water and give them to plants.

