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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

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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 CO_2 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 CO_2 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 CO_2 did not lead to a change in free living fungal community composition compared to ambient CO_2. However, under elevated CO_2, more gene modules of *S. cothurnatus* involved in C-N degradation pathways were impacted by soil C and N additions. In turn, under elevated CO_2 and when the EMF was present, we found high enrichment of non-targeted metabolites. The release of CO_2 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.