Poster #1-62

Berkeley Lab Terrestrial Ecosystem Science SFA (LBNL TES SFA) on Belowground Carbon Cycling

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In the Berkeley Lab Terrestrial Ecosystem Science SFA, we conduct basic research on the role of soils in terrestrial biogeochemistry and the Earth system. Our goals are to improve process-level understanding of ecosystem-climate interactions and to develop next-generation predictive capacity suitable for Earth system models. Current research in the SFA is centered around a set of field, laboratory, and model experiments to quantify and characterize the roles of different biotic and abiotic processes that influence soil carbon cycling, and how they may shape ecosystem responses to a warming climate. We are conducting a field manipulation experiment in a well-drained coniferous forest in which we are warming the whole soil profile (+4ºC) and adding ^{13}C-labelled litter at different soil depths. We are using the experiments to evaluate the influence of soil depth, mineralogy, biota, and climate on soil carbon dynamics, and applying the results and observations to inform model structures and parameters. Currently, a small number of groups world-wide are developing models for global-scale application that represent explicitly processes that limit microbial utilization of organic substrates, like sorption to minerals and nutrient limitation. We have developed a soil decomposition model where C cycling is mediated by minerals, nutrients, water, and microbes. We are using experimental data from the deep soil warming. Incubations, and other studies to guide model development in a reactive transport framework (using BeTR; Tang et al. 2013), and integrating this model into a version of the DOE E3SM land model (ELM). This poster will present results from the two warming experiments and highlight some recent results from the microbial and geochemical work being carried out in the SFA. Highlights for the warming experiment and modeling will be given in separate posters.