Poster# 100

Berkeley Lab Terrestrial Ecosystem Science SFA: 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 climate feedbacks. 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 coordinated set of model, field, and laboratory 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 two field manipulation experiments, in an annual grassland and a coniferous forest, that involve warming the whole soil profile 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 microclimate on soil carbon dynamics, and applying these research results and observations to develop and test new model structures and parameters. Currently, global-scale models do not represent the processes that limit microbial utilization of organic substrates, like sorption to minerals, nutrient limitation, and drought. 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 and incubations to guide model development in a reactive transport framework (using BeTR; Tang et al. 2013), and integrating this model into the ACME land model (ALMv0.0) to generate process-based hypotheses about the vulnerability of SOC to global change. This poster will present results from the two warming experiments and highlight some recent results from the microbial, mineralogical, biogeochemical, and modeling work being carried out in the SFA. More detail will be given in separate posters on these four areas.