LBNL Terrestrial Ecosystem Science SFA: Belowground carbon cycling

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In LBNL's Terrestrial Ecosystem Science SFA on soil carbon cycling, we conduct basic research on soil carbon turnover, storage, and loss. Our goal is to improve process-level understanding of biogeochemical dynamics and develop next-generation predictive capacity in global models of soils' role in ecosystem-climate interactions. Recent research demonstrates that environmental and biological controls are as important as soil organic matter (SOM) structure for SOM dynamics. To improve predictions of SOM response to climate change, we propose to integrate this emerging understanding into soil carbon models by conducting strategically designed experiments and using observations to test and develop new model structures and parameters. We will apply a combination of field and laboratory experiments, microbial ecology, advanced imaging, and numerical simulation modeling in the following tasks: (1) Whole-soil warming experiment: Biogeochemistry; (2) Functional analysis of microbial communities for soil carbon dynamics; (3) Microbial carbon use efficiency: Controls on rates, processes, products; (4) SOM stabilization via organo-mineral interactions; and (5) Soil biogeochemistry and carbon cycle modeling. This research bridges from molecular mechanisms of carbon stabilization to multi-scale biogeochemical models.