NGEE-Arctic: Migrating Knowledge Across Scales to Improve Climate Prediction

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Observations, experimentation, and modeling are being conducted across a range of scales in a permafrost tundra ecosystem in an effort to improve process-level understanding of physical, biogeochemical, biological, and ecological dynamics and interactions, with the goal of migrating this new knowledge up in scale to improve climate prediction. Models are being constructed and exercised in a nested hierarchical framework, with very fine-scale process-resolving models being parameterized using multiple observational constraints, and being run over selected sub-regions to inform coarser-scale parameterizations. Observations and laboratory studies in several process domains and across multiple spatial and temporal scales are being used to inform parameterizations, while independent observations and laboratory manipulations are being carried out to evaluate models and quantify model prediction uncertainties. Some of the developments presented here are being targeted for migration to new global-scale climate prediction frameworks. Successful generation of new process-level knowledge and migration of knowledge into predictive modeling frameworks depends on a rapid, accurate, and understandable approach to managing multi-faceted data. The project has developed and is using an integrated approach to collection, sharing, and management of observational, experimental, and modeling data.