

Next Generation Ecosystem Experiments (NGEE) Tropics: Overview

Tropical forests cycle more carbon and water than any other biome, and play critical roles in determining the Earth's energy balance. Yet there are large uncertainties regarding tropical forest response to a changing atmosphere and a warming climate. Many of these uncertainties are linked to how tropical forests interact with the global carbon cycle. First, intact tropical forests have been identified as a major sink for carbon, presumably driven by enhanced productivity under the rising concentration of atmospheric CO₂. Second, deforestation and degradation of tropical forests result in large CO₂ emissions. Third, regrowth of secondary forests on anthropogenic landscapes is estimated to be an additional large carbon sink. These major shifts in tropical forest carbon cycling also have important impacts on water and energy fluxes. To develop robust projections of these responses over the next century, the current treatment of tropical forests in Earth system models (ESMs) must be improved, requiring a major research effort to codify our best process based knowledge of tropical forest functioning. This effort will include both a rigorous knowledge assessment using the available data, and new field investigations that target improved representations of critical processes. This poster will overview our NGEE Tropics modeling and data frameworks to address these challenges, and associated field activities in three process areas: (1) forest carbon cycle hydrology interactions, (2) disturbance and recovery processes (both natural and anthropogenic), and (3) pantropical variability in nutrient constraints on productivity.