Poster #9-6

The Next Generation Ecosystem Experiments (NGEE)-Tropics Overview

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Tropical forests cycle more CO_2 and water than any other biome, and are critical to Earth's energy balance. Yet processes controlling tropical forest carbon cycling are not well established, and large uncertainties in observational estimates and Earth system model (ESM) projections of net carbon fluxes remain unresolved, contributing significant uncertainty to climate projections. The Next Generation Ecosystem Experiments (NGEE)-Tropics is a large multi-institutional research project funded by BER and aimed at improving ESM representation of tropical forest ecosystem responses to global changes. The overarching goal of NGEE-Tropics is to determine how tropical forest carbon balance and climate system feedbacks will respond to changing environmental drivers over the 21st Century. To accomplish this goal, NGEE-Tropics is developing a transformational, process-rich model framework (the Functionally Assembled Terrestrial Ecosystem Simulator–FATES) where the responses and feedbacks of tropical forests to a changing climate are modeled at the scale of a next generation ESM grid cell.

Research thus far has focused on developing an improved understanding and model representation of key tropical forest processes including: responses to changing temperature, precipitation, and atmospheric CO_2; disturbance and land-use change; and heterogeneity in belowground processes. FATES has been successfully integrated into DOE's Energy Exascale Earth System Model (E3SM), and further model development and measurement activities are being integrated at pilot study field sites in Puerto Rico, Brazil, and Panama. A data synthesis and management framework has been developed to provide data products via a community portal.