Title: The Distribution of EcM Trees in Lowland Tropical Forests
José Medina-Vega[1*], Stuart Davies[1], and ForestGEO partners.
[1]Forest Global Earth Observatory, Smithsonian Tropical Research Institute Panama

Contact: (medinaja@si.edu)
Project Lead Principal Investigator (PI): Jeffrey Chambers, Berkeley Lab
BER Program: ESS
Project: NGEE-Tropics (led by Berkeley Lab)
Project Website: https://ngee-tropics.lbl.gov/

Project Abstract:
A lot has recently been written about the global distribution of plant nutrient acquisition strategies related to symbioses between fungi and trees, typically asserting that lowland tropical forests are dominated by plants with arbuscular mycorrhiza (AM) symbioses while ectomycorrhiza (EcM) symbioses are rare or absent. Climatic effects on decomposition rates and local variation in soil quality are considered the main drivers of the global and the local, fine-scale pattern of plant-fungi symbiotic distributions. AM is predicted to dominate at low latitudes and in areas with high soil quality while at high latitudes, and in areas with low soil quality, EcM is predicted to dominate. Using data from a pantropical network of forest dynamics plots, we show that the three major areas of lowland tropical forest differ in their plant-symbiont composition. Most lowland Asian rainforests are dominated by EcM, primarily species of the Dipterocarpaceae. African forests are dominated by mixtures of ectomycorrhizal species, including large expanses of monodominant forests. With the exception of small areas in the Guiana Shield and some white-sand habitats, South American lowland rainforests, including the Amazon Basin, are dominated by AM symbioses and are largely devoid of EcM species. These major differences in plant-symbiosis relationships are unrelated to soil fertility or climate at the pantropical scale. Historical biogeography and unique patterns of diversification within the three regions have resulted in dramatically different forest compositions and putative nutrient-acquisition strategies. Earth System Models treat lowland tropical forests as one biome. Differences in patterns of plant-fungi symbiosis across the lowland tropics have important consequences for carbon uptake and storage in response to global environmental change.