

**Poster #9-36**

**Tropical Response to Altered Climate Experiment (TRACE): How Plant-Soil Interactions Both Respond To and Help Dictate Lowland Tropical Forest Responses To Warming**

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Due to the enormous amount of carbon, water, and energy tropical forests exchange with the atmosphere, there is substantial interest in refining our understanding of how these forests will respond to environmental changes such as a warming climate. While a high level of biodiversity suggests the potential for ecosystem-level resilience to increasing temperature, the data that do exist suggest that lowland tropical forests may indeed be quite sensitive to even subtle changes in temperature due to (1) already warm temperatures and (2) organisms that evolved and developed with low diurnal, seasonal, and interannual temperature variation. Here we describe a novel lowland tropical forest warming experiment in Puerto Rico where we used infrared warming lamps to heat understory plants and soils, as well as canopy warming infrastructure, to explore the relationships between temperature, plant physiology, soil respiration and fertility, and the biogeochemical exchanges that connect these ecosystem components. We found that tropical forest plants and soils were quite responsive to changes in temperature and that multiple carbon pools and fluxes were affected. Both foliar and root respiration acclimated to warmer conditions, though photosynthesis showed signs of stress and only partial acclimation. Availability of soil nutrients were also affected by warming. For example, indices of phosphorus availability declined with warming, suggesting that increased temperatures could indirectly affect tropical rain forest function above and belowground via changes to the availability of key nutrients. Further, warming stimulated soil CO<sub>2</sub> rates and suggested that, at least over the short-term, plant reductions in CO<sub>2</sub> uptake could be coupled with soil increases in CO<sub>2</sub> loss. We will synthesize our current understanding of the patterns and implications we've observed in the first year of warming for this unique tropical forest field experiment. We will explicitly consider above- and belowground processes, as well as their interactions. Overall, we are striving to help improve Earth System Model parameterization of the pools and fluxes of water, carbon, and nutrients in tropical forested ecosystems and the data shown will highlight how these cycles are coupled and independently altered by warming.