Poster #1-40

Tropical Forest Response to a Drier Future: Synthesis and Modeling of Soil Carbon Stocks and Age

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Tropical forests account for over 50% of the global terrestrial carbon sink and 29% of global soil carbon, but the stability of carbon in these ecosystems under a changing climate is unknown. Recent work suggests moisture may be more important than temperature in driving soil carbon storage and emissions in the tropics. However, data on belowground carbon cycling in the tropics is sparse, and the role of moisture on soil carbon dynamics is underrepresented in current land surface models limiting our ability to extrapolate from field experiments to the entire region. We are compiling carbon and radiocarbon (^{14}C) soil profile data from the tropics including sites in Mexico, Brazil, Costa Rica, Puerto Rico, Peru, Cameroon, and Indonesia. Our sites represent a large range of moisture, spanning 710 to 4200 mm of mean annual precipitation, and include Andisols, Oxisols, Inceptisols, and Ultisols. We compared measured soil C stocks and ^{14}C profiles to data generated from CLM and ELM. We found a large range in soil ^{14}C profiles between sites, and in some locations, we also found a large spatial variation within a site. We found that modeled carbon stocks were consistently higher than measured stocks, modeled soil carbon ages were older than measured values near the surface (upper 50 cm), and that modeled soil carbon ages for deep soil carbon were younger than measured deep soil carbon ages. Finer resolution runs of ELM-ECA and CTC and site-level model-data comparisons will provide more insight and be used to assess the role of climate vs other soil (e.g., soil type and parent materials) and ecosystem factors (e.g. rooting depth and litterfall) in driving vertically-resolved measured and modeled soil carbon pools and ages.