**Ph.D. thesis abstract**

*Understanding terrestrial organic carbon export: A time-series approach*

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Here I discuss methodological advancements and data analysis techniques for the Ramped PyrOx (RPO) serial oxidation isotope method developed at WHOI. To quantitatively investigate distributions of OC source, reservoir age, and chemical structure contained within a single sample, I developed a kinetic model linking RPO-derived activation energy, 13C composition, and radiocarbon content. Additionally, I present results from time-series sample sets collected on two end-member systems: the Congo River (Central Africa) and the LiWu River (Taiwan). For the Congo River, bulk and plant-wax-lipid 13C compositions indicate that particulate OC is consistently derived from downstream rainforest ecosystems. Furthermore, bulk radiocarbon content and microbial lipid molecular distributions are strongly correlated with discharge, suggesting that pre-aged, swamp-forest-derived soils are preferentially exported when northern hemisphere discharge is highest. For the LiWu River, a comparison between bedrock and soil OC content reveals that soils can contain significantly less carbon than the underlying bedrock, suggesting that this material is remineralized to CO2 prior to soil formation. Both the presence of bacterial lipids and lower activation energy 14C-free OC contained in soil saprolite layers indicate that this process is microbially mediated and that microbial respiration of rock-derived OC likely represents a larger geochemical flux than previously thought.

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