**Land-Use Change Drives Soil Carbon Composition in Subtropical and Tropical Peatlands**

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**Introduction**

Impacted peatlands contribute approximately 25% of all CO2 emissions from the land use sector (Bonn et al., 2014), and peatland degradation is currently intensifying in subtropical and tropical regions. Tropical peatlands are relatively poorly understood compared to northern peatlands, and soil carbon (C) composition differ widely.

We aimed to further explore how land-use impacts affect the SOC chemical composition of subtropical and tropical peatlands. This information is key to understand the impacts that progressive land conversion can have on ecosystem services of peatland soils.

**Experimental**

We quantified the molecular composition and stability of soil organic matter carbon from 39 subtropical and tropical peatlands using solid-state 13C nuclear magnetic resonance (NMR) spectroscopy. CPTOSS 13C Solid State NMR sprectra of dried, ground samples were obtained using a Bruker Avance II 500 MHz Spectrometer with a 3.2 mm H/C/N MAS probe at the AMRIS Facility. Spectra peaks were integrated to determine percent of C functional groups: carboxyl, aromatic, O-alkyl, methoxyl, and alkyl C. From these sites, four groups of peatlands were further targeted for more analysis to compare impacts of land use change: Florida Everglades, Eastern Indonesian, Western Indonesian, and North Carolina Pocosin peatlands.

**Results and Discussion**

Fig.1 Principal component analysis of subtropical and tropical peatlands shows differences in C composition due to vegetation inputs and land-use.

Soil C composition differed in subtropical and tropical peatland functional groups based on vegetation (p=0.006) and land use (0.001). Peat formed from herbaceous vegetation with minimal disturbance consisted of more oxygenated and single bonded carbon (Fig. 1). Land use impacts resulted in increased saturated or double bond C. Sites that were only drained, cleared, or burned had a higher proportion of alkyl C compared to sites impacted by crop production, and planting trees after drainage further increased alkyl C. which resulted in increased accumulation of aromatic C compared to sites not impacted by agriculture. Agricultural production in the Everglades and Eastern Indonesia peatlands resulted in more accumulation of aromatic C compared to sites not impacted by agriculture. Restoration restored the proportion of O-alkyl C to reference conditions.

**Conclusion**

Results from this study highlight the drastic changes long term land-use has on soil C composition from peatland ecosystems resulting in the loss of labile C and accumulation of alkyl and aromatic C depending on land use practices. Restoration of peatlands may replenish the soil profile with O-alkyl C to reference conditions.

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