

**Soil and Water Sciences Department  
Graduate Student Exit Seminar**

**Speaker:** Anna Normand  
**Ph.D. Degree Candidate**

**Advisors:** Dr. K.R. Reddy and Dr. Mark Clark

**Title:** **Global Peatland Soil Organic  
Carbon Chemical Composition  
and Greenhouse Gas Production**

**Date:** Monday, July 10, 2017

**Time:** 3:00 pm – 4:00 pm

**Location:** McCarty Hall A, Room G186



Peatlands play a critical role in the global carbon (C) cycle because they contain approximately 30% of the 1500 Pg of C stored in soils worldwide. However, the stability of these vast stores of C is under threat from climate and land-use change, with important consequences for greenhouse gas emissions. Ecosystem models predict C fluxes based on total soil C pools, but responses could vary markedly depending on the chemical composition of soil organic carbon (SOC). To determine the chemical nature and response to perturbation of SOC in peatlands worldwide, I quantified C functional groups of 125 freshwater peatlands using <sup>13</sup>C Nuclear Magnetic Resonance spectroscopy. A representative subset of the soils were incubated under aerobic and anaerobic conditions to determine how SOC chemical composition influences carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) production from impacted peatlands. Results showed that SOC functional chemistry varies markedly and regulated by long term land-use change, mean annual temperature, nutrient status, and vegetation. Despite this variation, results showed predictable responses of greenhouse gas production based on SOC chemistry. This integrated effect of SOC chemical composition was defined by a novel stability index, with greater CO<sub>2</sub> and CH<sub>4</sub> fluxes from soils enriched in oxygen-containing organic C (O-alkyl C) and depleted in aromatic and hydrophobic compounds. Finally, it is recommended that utilization of the SOC stability index in ecosystem models can potentially improve estimates of CO<sub>2</sub> and CH<sub>4</sub> fluxes from peatlands, and ultimately inform management strategies to reduce C loss from these ecosystems.

For our off-campus students, off-campus faculty, and on-campus students who cannot attend, this seminar can be viewed via live or watched at a later date via this link: [Anna Normand](#). In addition, all seminars are archived for viewing on our [SWSD Seminar Page](#).