Poster #1-45

Peatland Respiration: A Global Quantitative Review

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Since the last glacial maximum, peatlands have sequestered vast amounts (600 Gt) of carbon (C) globally. This storage capacity and previously stored C are vulnerable to climate change. Warming and drying of northern peatlands, for example, is expected to increase C losses from these systems and further feedback into climate warming. The magnitude and mechanisms of this increased C loss remains unconstrained. Temperature and moisture changes in peatlands are associated with changes in plant community composition. However, the net result of these abiotic and structural changes on peatland ecosystem respiration globally remains unclear. Over the past three decades, peatland carbon cycling has been studied to estimate rates of production, decomposition and C accumulation. Chamber flux measurements are a common method used to estimate inputs and losses of C. Structural (plant community) and abiotic (moisture, temperature and pH) controls on peatland CO_2 flux have also been investigated in disparate studies but have not been compiled to test overarching hypotheses on structure-C function linkages. It is unclear whether hypotheses about structural controls on C fluxes are true for a diversity of peatlands globally. Modeling future changes in peatland C function and its impacts on the global carbon cycle requires a comprehensive quantitative understanding of previously measured ecosystem dynamics.

We will present a quantitative synthesis of all published peatland CO_2 flux data with a focus on structure-function links in these ecosystems. In addition to compiling the first dataset that incorporates all existing chamber CO2 flux data (ecosystem respiration, ER; and net ecosystem exchange, NEE) from peatlands, we will examine the following questions: 1) what is the spatial and temporal variability of *in situ* ER from northern peatlands, 2) what are the major structural and abiotic controls on peatland CO_2 exchange (focus on plant trait link to flux as well as temperature and moisture sensitivity), 3) what are the remaining knowledge gaps regarding ER and CO_2 exchange in northern peatlands, and 4) can lessons learned from northern peatlands be applied to the less-studied tropical peatlands? This review will synthesize existing knowledge on peatland ER globally, provide a conceptual framework and dataset, and highlight knowledge gaps; all necessary steps toward understanding and modeling future peatland C function.