Methane Dynamics in Peatland Ecosystems: Reassessing Patterns and Processes. (S10-smemo135959-Poster)

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Abstract:

Peatland ecosystems represent a large global carbon sink, and an important source of atmospheric methane (CH4). Traditional models of peatland CH4 dynamics have addressed the balance between CH4 production in anoxic portions of the peat and CH4 consumption in the oxic portion. We present evidence for CH4 consumption under anoxic conditions, and a reassessment of conceptual models of CH4 dynamics. Peat samples were collected from sites in New York, West Virginia, Minnesota, and Sweden, representing a gradient from minerotrophic to ombrotrophic. Samples were incubated in the lab under anoxic conditions. Results show that CH4 is readily consumed in the absence of oxygen, and that rates can exceed CH4 production. Spatial patterns also suggest that anoxic consumption rates are greatest in minerotrophic sites and absent in the most ombrotrophic sites, suggesting the process is limited by electron acceptor availability. These results have led us to rethink carbon cycling in peat soils, and constraints on CH4 fluxes to the atmosphere. An improved mechanistic understanding of peatland CH4 dynamics is vital to predicting how these systems will respond to potential climate changes.

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