Poster #56

Organic Carbon Decomposition Under Elevated Peat Warming and CO_2 Conditions at SPRUCE.

RM Wilson[1], MM Tfaily[2], MM Kolton[3], WT Cooper[4], PJ Hanson[5], JP Chanton[1], and JE Kostka[3]

[1] Department of Earth Ocean and Atmospheric Sciences, Florida State University, Tallahassee, FL 32306
[2] Environmental and Molecular Sciences Laboratory, Pacific Northwest National Laboratory, Richland WA
[3] School of Biological Sciences, Georgia Institute of Technology, Atlanta, GA
[4] Department of Chemistry, Florida State University, Tallahassee, FL
[5] Oak Ridge National Laboratory, Oak Ridge, TN

Contact: Rachel Wilson [rmwilson@fsu.edu]

High latitude peatlands store a globally significant reservoir of organic carbon. Microbial decomposition results in the conversion of organic carbon to CO_2 and CH_4. However, organic carbon stored in peatlands has remained sequestered in part because the anoxic cold conditions at these sites has slowed microbial decomposition of the peat. Climate change has led to disparate climate warming in northern latitudes presenting the possibility that microbial decomposition could be stimulated. Thus warming is expected to increase emissions of CO_2 and CH_4 which would create a positive climate feedback as these emission products are themselves strong greenhouse gases. Recent studies, however, suggest that warming may not be the only control on microbial decomposition in boreal peat (Wilson et al. 2016, 2017). We hypothesize that the lability or recalcitrance of the organic compounds in the peat itself may impart some resistance to microbial decomposition. To test this hypothesis we used multiple complementary analytical techniques to characterize the organic matter in peat collected from the Spruce and Peatlands Responses Under Climate and Environmental Change (SPRUCE, mnspruce.ornl.gov) site along with high resolution, both temporally and spatially, measurements of CO_2 and CH_4 production under elevated temperature and CO_2 treatments.

1Wilson, RM et al. (2016) Stability of peatland *Nature Communications*, 7, 13723
2Wilson, RM et al. (2017) *Journal of Geophysical Research: Biogeosciences, in press.*