Speciation of mercury and sulfur in northern peatlands

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Peatlands are sinks for total Hg and can be sources of toxic methyl Hg through the activity of sulfate-reducing bacteria [1]. In this study, we investigate how organic and inorganic S speciation affects MeHg concentrations in soil and porewaters across northern peatlands with different physical, chemical, vegetation, and hydrological characteristics by utilizing various analytical tools.

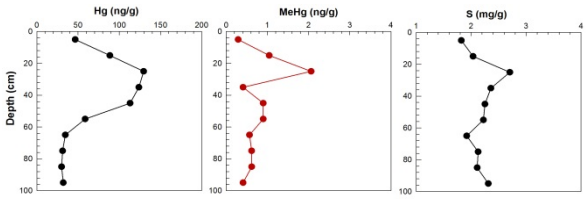

Figure 1. Hg, MeHg, and S concentrations in peat depth profiles.

Results of this study indicate that S, Hg, and MeHg concentrations peaked in the subsurface at 20-40 cm; the greatest MeHg concentrations were observed in the transition zone between the transiently oxidized acrotelm and the permanently saturated anaerobic catotelm. Porewaters in precipitation-fed acidic ambrotrophic bogs showed the highest DOC, MeHg, and Hg concentrations as compared to fens fed by groundwater. Further investigation of S speciation and molecular composition of organic S-containing compounds in solid and DOC phases by X-ray absorption near-edge spectroscopy and ultra-high resolution Fourier transform ion cyclotron resonance mass spectrometry will help us establish mechanistic linkages between S and Hg cycles in northern peatlands and predict peatland responses to climate change.

[1] Kolka, R. K. *et al* Mercury cycling in peatland watersheds. In *Peatland Biogeochemistry and Watershed Hydrology at the Marcell Experimental Forest*; Kolka, R. K., Sebestyen, S. D., Verry, E. S., Brooks, K. N., eds.; CRC Press: Boca Raton, FL, 2011; pp. 349−370.