**Wetland Soils as Harbors of Mercury: The Vulnerability of Mercury Leaching Export to Streams under Changing Land-Use and Climatic Regimes**

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**Project Abstract**

Many wetland ecosystems harbor large stocks of soil organic matter, and thereby serve as long-term sinks for mercury (Hg) deposited in dryfall. Mercury deposition to temperate and even remote high latitude ecosystems has increased in recent decades with industrial emissions, accelerating methyl Hg toxicities in humans. The methylation of Hg in aquatic environments is controlled by ecosystem Hg pools as well as soil hydrology and reduction-oxidation reactions. We hypothesize that climatic and land-use controls on soil organic matter losses (wetland conversion, decomposition, and leaching) will increasingly mobilize stored Hg from wetlands across the landscape, with the potential to accelerate Hg methylation. Our first objective is to quantify Hg stocks in wetland soils in the organic soil-rich wetlands of northern Michigan and interior Alaska. These two regions represent the southern and northern end of widespread peat accumulation, respectively, but differ in their susceptibility to local versus long-range transport of industrial Hg emissions. We will identify how much of this stored Hg is vulnerable to leaching losses through changing soil climate (temperature and hydrology) using simple leaching experiments and a wetland core soil climate manipulation experiment. These data will be used to construct a conceptual model of how soil characteristics and soil climate variables control Hg transformations and transport from wetlands to aquatic ecosystems. We also will utilize recent land cover data and stream macroinvertebrate sampling to explore the consequences of wetland cover and land-use for methyl Hg bioaccumulation. By linking mechanisms of Hg methylation to landscape patterns (wetland cover, type, drainage), we will provide the groundwork to create spatial “hotspot” maps of Hg storage and methyl Hg risks to streams.