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Mercury methylation and demethylation on impacted wetland soils: effects of temperature

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The methylation of mercury by anaerobic microbes in wet soils and sediment significantly increases its bioaccumulation potential into wildlife. Methylation is also counter-acted by demethylation processes, with the balance between methylation and demethylation processes ultimately controlling the amount of methylmercury in a system. Given that microbial activities are intricately linked with temperature, climatic changes should impact mercury methylation and demethylation processes, but this is not well-characterized in mercury research. In this presentation, I will discuss the outcome of better understanding mercury methylation and demethylation processes and rates in boreal wetland soils, as affected by temperature. To examine this, we have included a series of controlled, closed-system, flow-through experiments using boreal wetland soils from both forest-impacted and unimpacted wetlands in dark growth chambers across a range of realistic temperatures (5, 10, 15, 20, 25 °C). Mercury methylation and demethylation processes were examined in soil cores using enriched mercury isotope incubations and analyzed against measures of microbial activity and soil/water chemistry. Results from this study are expected to allow us to begin modeling mercury cycling processes with respect to climate and other environmental changes.