Using Ice and Sediment Cores to Quantify Climate-Warming Induced Inputs of Legacy Mercury to Lake Hazen, Nunavut

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Mercury (Hg) emitted from anthropogenic sources can undergo long-range atmospheric transport to the Arctic where it may cause health concerns for Arctic wildlife as well as Indigenous people consuming traditional country foods [1]. Temporal trends in atmospheric Hg deposition to Arctic ecosystems have been investigated using ice cores and sediment cores. However, many sediment records do not show a clear decline in Hg deposition despite estimates that Hg emissions from anthropogenic sources have recently stabilized or declined, suggesting that Hg is being remobilized in catchments and delaying the recovery of lakes following emission reductions [2,3]. To date there is little data on whether the input of legacy Hg increases Hg accumulation in lakes. We hypothesize that the climate-warming induced melting of glaciers may be remobilizing legacy Hg from glaciated watersheds into downstream lakes, providing an important subsidy of Hg in addition to modern Hg inputs. We will test this hypothesis by comparing Hg accumulation rates through time measured in an ice core and sediments cores collected within the Lake Hazen watershed on northern Ellesmere Island (Nunavut, Canada). By comparing ice and sediment core data, we can determine how post-depositional processes in the watershed controls delivery of legacy and modern Hg into Lake Hazen and whether legacy Hg inputs are increasing the rate of Hg accumulation in the lake. The temporal trends in atmospheric Hg deposition will be compared to known changes in anthropogenic production and/or emission of Hg. Our research will elucidate whether climate change may delay the benefit of decreasing Hg emissions in glaciated and Arctic watersheds, and help improve models of global Hg cycling, develop policies on Hg management, and better manage contaminant exposure for Arctic people and wildlife.

[1] Lehnherr (2014) *Environ. Reviews* **22**, 229-243. [2] Engstrom *et al.* (2014) *Environ. Sci. Technol.* **48,** 6533-6543. [3] Vermilyea *et al.* (2017) *Sci. Total Environ.* **599,** 145-155.