Spatial assessment of total mercury in surface waters, soils and moss (*Hylocomium splendens*) on Baffin Island, NU

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NSTP PFSN Northern Scientific Training Program / Programme de formation scientifique dans le Nord

NSERC CRSNG

Environment and Climate Change Canada

The Canadian Arctic receives long-range atmospheric input of elemental mercury (Hg) which travels to the region under the influence of global distillation from Asia, Europe, and North America.

The magnitude of Hg deposition in the Arctic is of upmost concern as it is a demonstrated bioaccumulator, posing a threat to human health, as a subsistence lifestyle is common to Arctic inhabitants.

The objective of this study was to provide a more comprehensive understanding of total mercury (THg) concentrations in moss, soils, and surface waters on Baffin Island, Nunavut.

Methods

Hylocomium splendens ▶

Surface waters

- Two 40 mL I-Chem vials
- Tekran Mercury Analyzer Model 2600
- EPA 1631 Cold vapor atomic fluorescence spectroscopy (CVAFS)

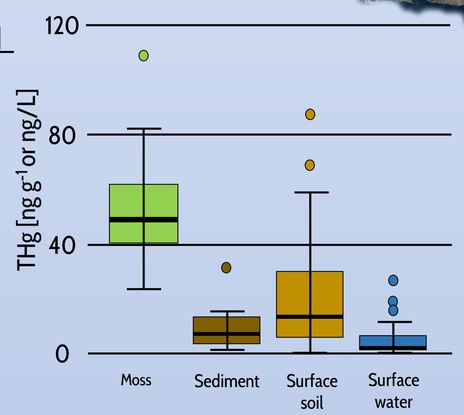
Moss, surface soils, and sediment

- 5 g of moss within 50 m^2 area
- ~100 g of surface soil (0-5 cm)
- ~100 g of a composite lake sediment sample
- Samples were air dried and pulverized
- Mercury analyzer-Milestone DMA-80

Results

Parameter	Count	THg [ng L^{-1}]	pH	DOC [mg/L]	THg [mg kg^{-1} DOC]
Water	96	4.06	6.78	4.78	2.46
Parameter	**Count**	**THg [ng g^{-1}]**	**pH**	**OM% [%]**	**THg [mg kg^{-1} SOC]**
Surface Soil	40	22.57	5.55	7.1	0.67
Sediment	14	9.12	5.54	2.69	
Parameter	**Count**	**THg [ng g^{-1}]**			
Moss	53	50.9			

Region	THg [ng g^{-1}] Moss	THg [ng L^{-1}] Surface water	THg [ng g^{-1}] Surface soil	THg [ng g^{-1}] Sediment
Pond Inlet	85.99	9.28	12.43	10.38
Iqaluit	49.40	1.91	27.34	8.72
Aauyuittuq NP	51.74	2.05	0.20	
Kimmirut	55.47			

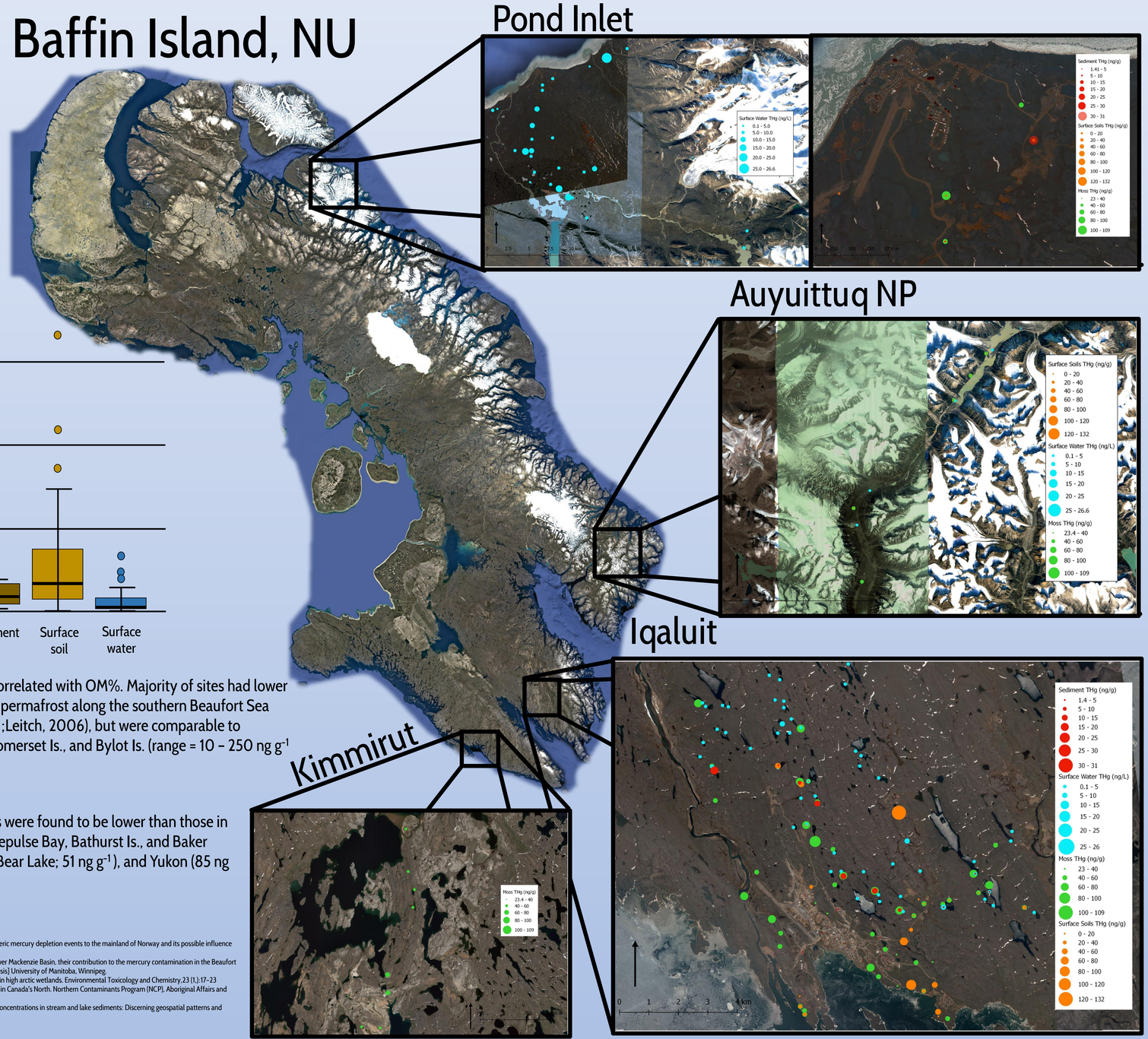


Pond Inlet had higher THg and higher DOC (mean = 11.01 mg/L) than the other regions, which reflects the low relief, highly productive (inputs of birds and more vegetated catchment) nature of the area. Results are within the natural range found in the Canadian Arctic 0.1 -19.8 ng L^{-1} (NCP, 2012).

Soil THg concentrations were not correlated with OM%. Majority of sites had lower concentrations than those found in permafrost along the southern Beaufort Sea coastline (range = 60 to 300 ng g^{-1} ;Leitch, 2006), but were comparable to wetland soils from Cornwallis Is., Somerset Is., and Bylot Is. (range = 10 – 250 ng g^{-1} , mean = 46 ng g^{-1} ; Loseto, 2004).

Moss THg concentrations in southern sites presented similar concentrations to those found in northern Norway (40-80 ng g^{-1}), although concentrations in Pond Inlet were typically higher (mean= 85.99 ng g^{-1}), which may be the result of AMDE's (Atmospheric Mercury depletion events)(Berg et al., 2008).

Mean sediment THg concentrations were found to be lower than those in other parts of Nunavut (46 ng g^{-1}; Repulse Bay, Bathurst Is., and Baker Lake), Northwest Territories (Great Bear Lake; 51 ng g^{-1}), and Yukon (85 ng g^{-1}) (Nasr et al., 2011).



Acknowledgments

We thank PCSP for helicopter support, the research groups of Dr. Erica Nol, Dr. Paul Allen, and the Nunavut Research Institute, for their assistance in the field, and Brian Dimock for laboratory assistance. This project was partly funded by Environment and Climate Change Canada (ECCC).

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