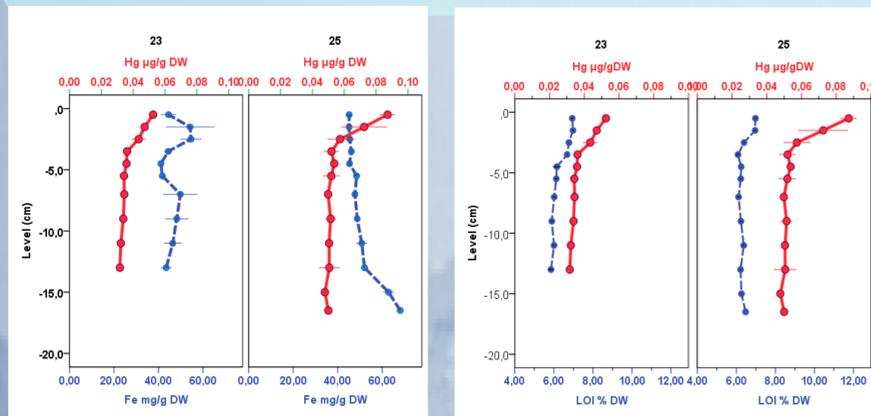


Trace Elements in Lakes in the Canadian High Arctic

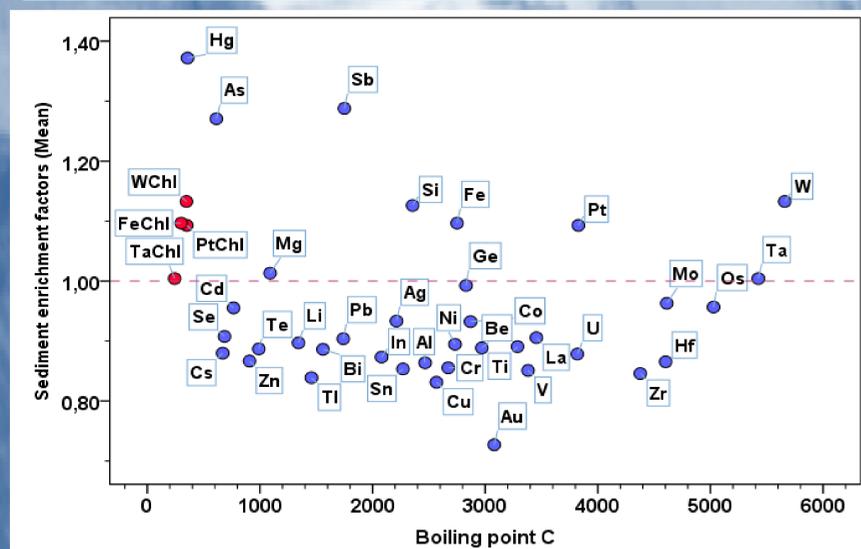
Borg, H., Meili, M. and Sundbom, M.

Objectives

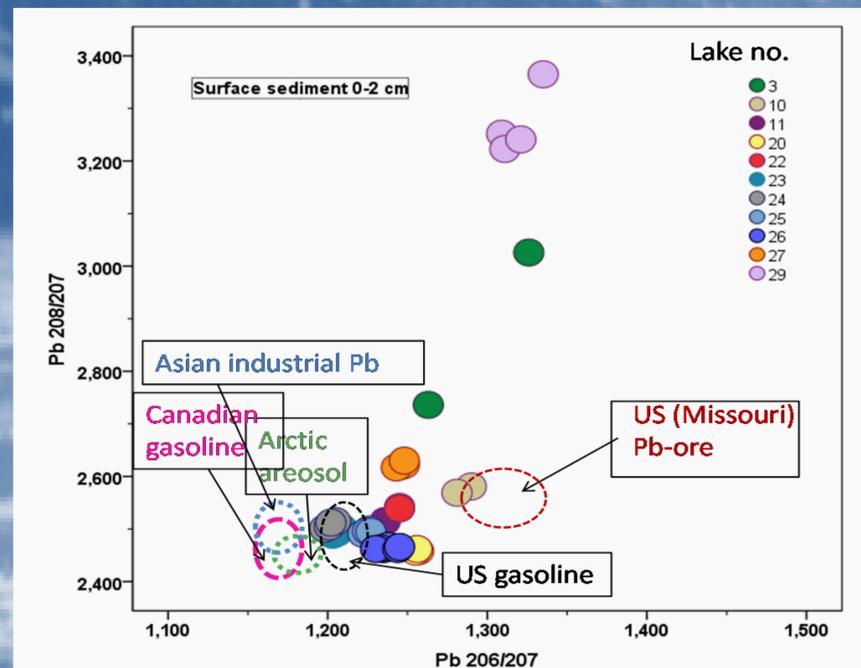
In order to evaluate the influences of natural and anthropogenic factors on the trace metal distribution in remote tundra lakes, water, sediments and fish were sampled in seventeen catchments in the Canadian Arctic.



Surface enrichment of Hg in the sediment cores from several lakes may indicate influences of long-range airborne pollution (e.g. Lake 25, Ellef Ringnes Island, above), and/or diagenetic redistribution correlated to Fe, and organic matter (Lake 23, Banks Island).



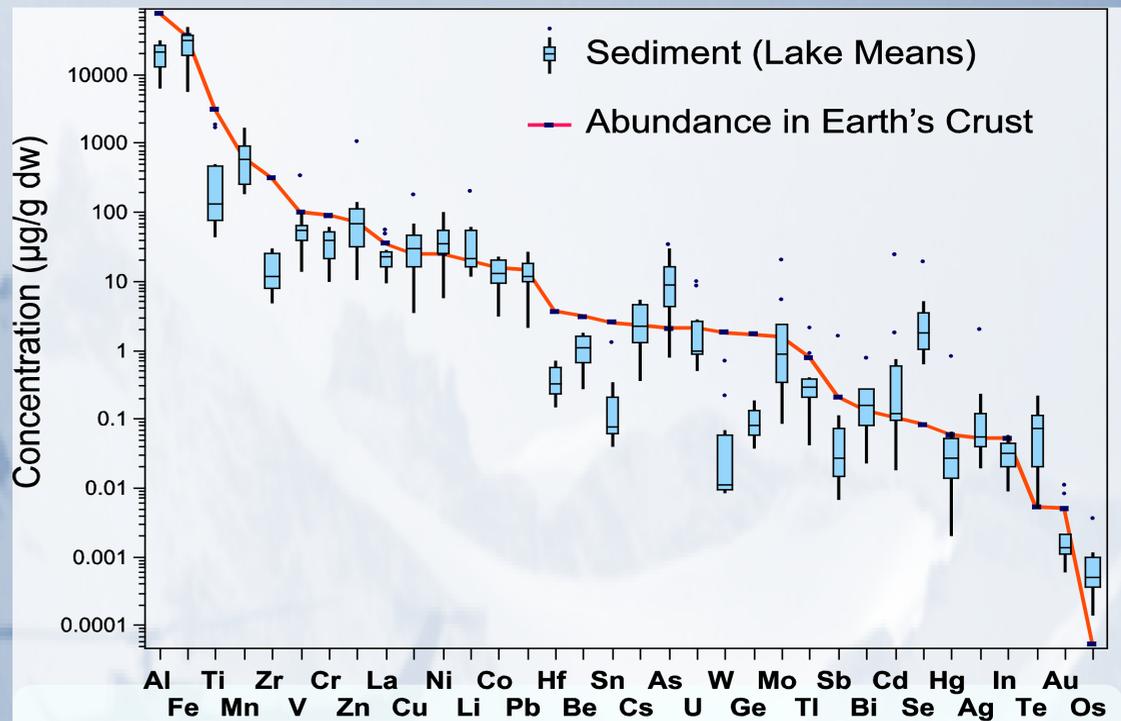
Some elements with high volatility (low boiling points) tended to show higher enrichment factors in sediments. Elements with high boiling point, e.g. W, also showed enrichment factors above 1.0, possibly caused by presence of volatile chlorides in long-range emissions from e.g. coal burning and waste incineration.



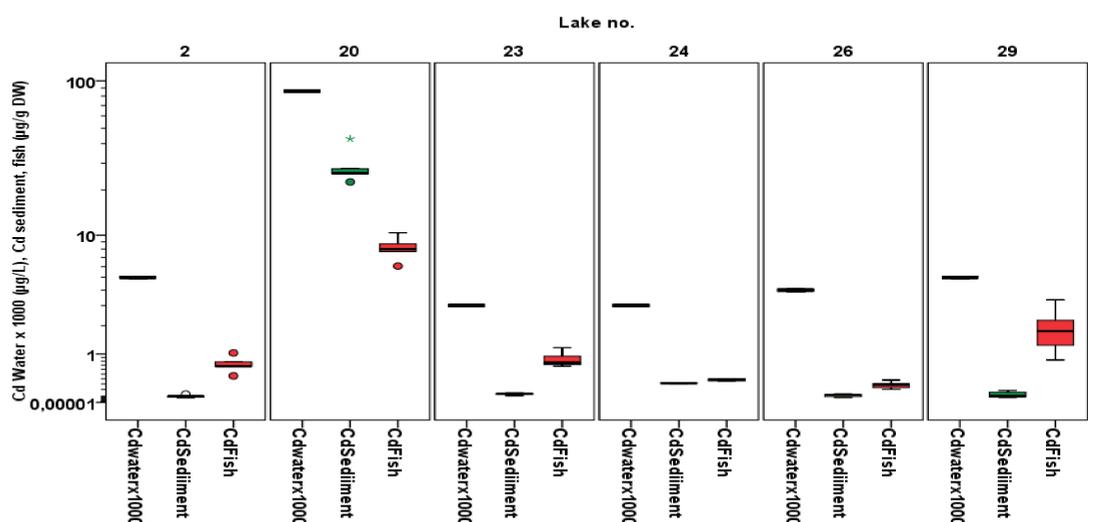
The ratios of $^{206}\text{Pb}/^{207}\text{Pb}$ vs $^{208}\text{Pb}/^{207}\text{Pb}$ in surface sediments. In most lakes, the distribution of Pb-isotopes resembles the ranges in US gasoline, which may indicate some influence of long-range airborne Pb.

Conclusions

- Metal levels in sediments were relatively close to the crustal abundance.
- Elevated concentrations of some elements were found in sediments, water, and Arctic char liver, at Ivvavik NP, Yukon.
- Surface enrichment of Hg in sediments was correlated to Fe and organic C, and in some cases possibly influenced by long-range airborne emissions.
- Volatile elements showed higher enrichment factors in sediment profiles, indicating contribution from long-range airborne emissions.
- Pb isotope ratios in sediments resembles the ratios US gasoline.

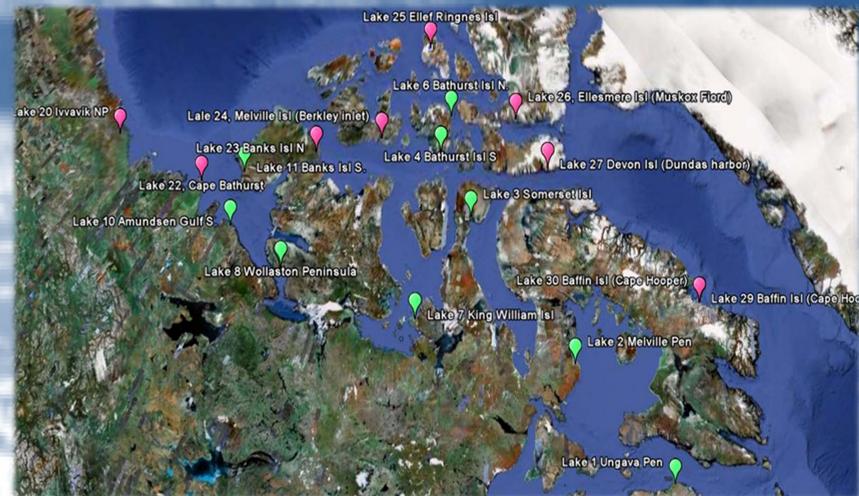


Generally, the levels of most elements in the lake sediment cores were similar to or lower than the average crustal abundance (sedimentary rocks, sandstone) (1)



Elevated metal concentrations in sediments occurred in the Ivvavik National Park in Yukon (Lake 20). As, Ag, Cd, Cu, Hg, Se, Zn, and others were substantially elevated, indicating sulphide ore deposits in the catchment. This was also reflected in water, and as high concentrations of Cd and Cu in Arctic char liver.

Sampling sites. Water, sediment and fish were sampled, and trace elements were determined with ICP-MS (Hg by catalytic combustion AAS).



Reference (1): Wedepohl, K.H. 1995. The composition of the continental crust. Geochim Cosmochim Acta, 59, 1217-1232.

Acknowledgements: This study was financed by the Swedish Research Council, the Craaford Foundation, and the Swedish Polar Research Secretariat. We acknowledge the excellent support from the crew and the helicopter pilots of the Canadian Coast Guard ice-breaker Louis S. St-Laurent during the Tundra North West 99 expedition.

