Assessing lead contamination sources of northeast Pacific Ocean

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Historic and industrial lead (Pb) emissions have greatly changed Pb concentrations and isotopic composition in the ocean. Lead isotopes show potential for tracking foraging areas of marine organisms. Here we aim to determine the Pb contamination sources in the northeast Pacific Ocean using fish that have different geographic locations for feeding. Sockeye salmon is an ecologically important species that can migrate thousands of miles from the coast to offshore feeding grounds. Preliminary results have showed that sockeye salmon returning to central British Columbia have low concentrations of heavy metal pollutants. Their Pb isotopic composition overlaps that of seawater from the northeast Pacific Station Papa (50.00N, 145.00W). A previous study attributed this seawater Pb isotopic composition to the Asian eolian Pb contribution [1] and data from our study suggest these salmons may feed predominantly far offshore where Pb is initially produced by Asian industries and then transported by the subarctic current. Alternatively, these salmon Pb isotope compositions might be related to local anthropogenic sources since the data also overlap those found in trees of Stanley Park trees in downtown Vancouver. To further assess this, we will measure the Pb isotopic composition of Pacific herring and bivalves (oysters and mussels) samples as representatives of coastal and estuarine Pb signatures. The data presented here will be valuable for assessing the relative importance of various Pb contamination sources across coastal and offshore regions of the Northeast Pacific, where no comprehensive Pb isotope data in seawater currently exist.

[1] McAlister J. 2015. Biogeochemistry of dissolved gallium and lead isotopes in the northeast pacific and western arctic oceans: University of British Columbia.