# Stable Hg isotope study of monomethylmercury sources in Pacific and Atlantic Ocean

PRIYANKA CHANDAN[1], ZOFIA BAUMANN[2], NICHOLAS S. FISCHER[2], DANIEL J. MADIGAN[2] AND BRIDGET A. BERGQUIST[1]

[1]Department of Geology, University of Toronto, 22 Russell Street, Toronto, ON M5S 3B1, Canada
[2]School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY 11794, USA

The ocean is a major repository of atmospherically derived mercury (Hg) and serves both as a source and sink in the biogeochemical Hg cycle. In ocean sediments, bottom waters and within the water column, some fraction of Hg is methylated to monomethylmercury (MMHg), which bioaccumulates in marine food webs. Humans and wildlife are exposed to MMHg, which can be neurotoxic, through consumption of marine fish. To help understand MMHg contamination in marine ecosystems, recent studies have explored the use of stable Hg isotopes as a promising new tool to understand MMHg sources to marine fish [1,2]. Open ocean fish display both Hg mass-dependent (MDF) and mass-independent fractionation (MIF). These initial observations are thought to be a result of photo-demethylation in surface waters and Hg methylation occurring in ocean water column.

Here, we present the isotopic composition of Hg for three species of tuna from the North Pacific Ocean to assess the factors that potentially control the isotopic signature of Hg in open ocean fish. Similar to previous studies, the tuna display both Hg MDF and MIF. The Hg isotopic signatures preserved among different species of tuna are similar, but there are small differences between the different species. Overall, the Pacific tuna from this study and from Blum *et al*. [2] are also similar but slightly offset from the Gulf of Mexico (GOM) tuna. All open ocean tuna are significantly offset from coastal fish [1,3]. It is possible that the large differences between open ocean and coastal tuna are due to differences in MMHg sources. However, the differences among open ocean species are likely due to variations in the degree of MMHg photo-degradation in the water column in different ocean regions or ocean depths where the fish feed. We are analysing Atlantic tuna to establish if the observed offset between the Pacific and the GOM tuna is reflective of a difference between Pacific and Atlantic MMHg cycle. The signature of MIF (i.e. $\Delta^{199}Hg/\Delta^{201}Hg$) was determined for all North Pacific tuna as 1.26 ± 0.06 (2SE), which is similar to the slope observed for freshwater fish.

[1] Senn *et al* (2010) *Environ. Sci. Technol.* **44**,1630-37 [2] Blum *et al* (2013) *Nature Geosci.* **6**,879–84 [3] Gherke *et al* (2011) *Environ. Sci. Technol.* **45**,1264-70