Atmospheric deposition of volcanic Hg on a Jurassic lava flow of the Central Atlantic Magmatic Province

JESSICA H. WHITESIDE[1], LAWRENCE PERCIVAL[2], TAMSIN A. MATHER[3], PAUL E. OLSEN[4]

[1]Ocean and Earth Science, National Oceanography Centre Southampton, UK. *J.Whiteside@soton.ac.uk
[2]Institute of Earth Sciences, University of Lausanne, Lausanne, Switzerland
[3]Department of Earth Sciences, University of Oxford, UK
[4]Department of Earth and Environmental Sciences, Columbia University, Lamont-Doherty Earth Observatory, Palisades, NY, USA

Emplacement of the vast Central Atlantic Magmatic Province (CAMP) lavas overlaps with the end-Triassic extinction, and has been implicated as its cause. Unequivocal products of specific CAMP eruptive events have yet to be clearly identified in strata deposited far from the province. Mercury (Hg) anomalies provide one potential far-field tracer, and have been documented in sediments thought to coincide with early CAMP eruptions. However, an unambiguous linkage of Hg anomalies to specific CAMP eruptive events has yet to be demonstrated. Nor is there any published Hg record from the time of the younger CAMP eruptions.

To investigate whether an Hg anomaly can be linked to a specific CAMP eruption, we sampled where the Hook Mountain Basalt contacts with the overlying Boonton Fm. and underlying Towaco Fm. (both red lacustrine strata) of the Newark Basin (NY, NJ, PA - USA). We used contiguous channel samples each averaging 6.8 cm for a total of 4.8 m of section.

Very low values of Hg were observed in virtually all samples, with slightly elevated values only occurring at the cracked and vesicular top 20 cm of the basalt. Very low organic matter content (0-0.2%) characterizes the samples. There is little variability in $\delta^{13}C$ in sedimentary strata underlying the basalt ($\delta^{13}C_{TOC}$ = -25±1‰) through to the contact with the overlying Boonton Fm., where values shift to -28±1‰. There is no correlation between TOC and $\delta^{13}C_{TOC}$.

Given the atmospheric residence time of Hg, we interpret the higher Hg in the porous top surface of the basalt as possible atmospheric fallout from the eruption of the Hook Mountain basalt, trapped within a few years of its eruption. To our knowledge, Hg preservation on the porous crust of eruptions has not been previously explored, but may be a rich source of information about large igneous provinces.