Particulate metal stable isotopes in the South Atlantic

SUSAN H. LITTLE[12], DEREK VANCE[2] AND ANGELA MILNE[3]

[1]Department of Earth Science and Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ

[2]Institute for Geochemistry and Petrology, Department of Earth Science, ETH Zürich, Switzerland

[3]School of Geography, Earth and Environmental Sciences, University of Plymouth, Drake Circus, Plymouth PL4 8AA

Particles are a fundamental part of the oceanic biogeochemical cycling of trace metals, both directly, in their input, dissolution, aggregation, disaggregation and removal to sediment, and indirectly, as surfaces for scavenging and transport. The details of their role remain relatively poorly understood, however, largely due to difficulties associated with sampling and analysis. One of the goals of the GEOTRACES program is to address these difficulties, with the result that high quality trace metal particulate data is now becoming available (e.g., [1]). This data is shedding new light on the inputs and the internal cycling of bioessential trace metals within the water column but many open questions remain. To date, only very sparse isotopic data for particulates has been presented (e.g., [2]). Such data has the potential to distinguish the contribution of biogenic, authigenic, and lithogenic phases to the total metal complement of the particles. More significantly, isotopic data for particulates also has the potential to provide quantitative information on the relevance of particulates to oceanic mass balance.

We present one of the (if not the) first attempts to measure stable metal isotope variability within different fractions of particulate material collected as part of the UK-GEOTRACES South Atlantic cruise in 2011-12. We compare concentration and isotopic data for a range of metals (including Cu, Zn and Ni) from bulk dissolution of filters (ashing) with that for a weak acidic leach, the latter targeting the labile metal fraction. Preliminary results confirm clear isotopic heterogeneity, with the lithogenic fraction isotopically distinguishable from the labile pool. For example, the labile fraction of Cu is isotopically similar to the Cu isotopic composition of Fe-Mn crusts, indicating a strong influence of authigenic Mn oxides on Cu.

[1] Rauschenberg, S., & Twining, B. S. (2015). *Mar. Chem.*, *171*, 67-77. [2] Revels, B. N., Ohnemus, D. C., Lam, P. J., Conway, T. M., & John, S. G. (in press). *Deep Sea Res. II*