

Global Oceanic Cadmium Isotope Distribution

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Recent cadmium isotope studies of the oceans have shown a depth control on Cd isotope fractionation in seawater, resulting from biological uptake in the surface and remineralization at depth, while the isotope distribution follows the large-scale deep water circulation [1]. In addition, heavier Cd isotopic signatures are found in deep waters of the North Atlantic [2, 3] compared to those in the Southern Ocean [1, 2].

Here we summarize new Cd isotope data from the North Atlantic (cruise PE319), along the western boundary of the South Atlantic (cruise 74JC057), as well as a high-resolution profile at Station Papa and along Line P in the Northeast Subarctic Pacific (cruises 2012-13 and 2013-18). Clear Cd concentration and isotope gradients are resolved along isopycnals. While diapycnal mixing strongly controls the Cd isotope variations in Atlantic deep waters, Pacific deep waters are strikingly homogeneous below ~150 m and have “lighter” Cd indistinguishable from that of Antarctic bottom waters.

These new datasets emphasize the importance of remineralization on the deep water Cd mass balance of the global ocean. The remineralization effects will be explored using multi-box modelling of the global circulation, coupled to a simplified model of the biological consumption-regeneration cycle, with the aim of quantifying fluxes as a function of overturn rates.

[1] Abouchami *et al* (2014) *Geochim. Cosmochim. Acta*, **127**, 348-367 [2] Xue *et al* (2013) *Earth Planet. Sci. Lett.* **382**, 161-172 [3] Boyle *et al* (2012) *Limnol. Oceanogr. Methods* **10**, 653-665