

Barium isotopes in South Atlantic sediment pore waters

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Ba isotopes have been developed recently as a new tracer for studying marine Ba and organic carbon cycles [1, 2]. The marine Ba isotopic budget is dominantly controlled by external inputs (e.g. riverine and hydrothermal inputs) and internal cycling in the ocean (e.g. Ba removal and regeneration in the water column and sediment pore water).

Sediments play an important role in marine Ba cycles. Studies have shown that 30% of the exported Ba is buried and preserved in sediments, and that nearly 70% is regenerated back into the water column or sediment pore water during early diagenesis [3]. Despite the fact that the benthic Ba input is important and could have a significant impact on the marine Ba isotopic budget, we know very little about its Ba isotopic compositions or if there is any isotope fractionation during early diagenesis.

In this study, we measure Ba isotopic compositions in South Atlantic sediment pore waters (0-12cm below the sea floor) and in overlying bottom waters. Preliminary data show a range of $\delta^{138/134}\text{Ba}$ from +0.21 to +0.35‰ in pore waters, and from +0.27 to +0.31‰ in overlying bottom waters. These values are similar to those previously measured in deep seawaters (+0.27 ~ +0.38‰, [1, 4]), but heavier than those in suspended barite-bearing particles (+0.05 ~ +0.10‰, [5]) and sediments (-0.09 ~ +0.10‰, [6]) around this region.

Sedimentary Ba isotopes in the same cores used for pore water analyses will also be investigated to help us to explain the isotopic signatures of regenerated Ba in sediment pore waters. This study provides the first constraints on Ba isotope composition and fractionation in pore waters, allowing us to evaluate the impact of early diagenesis in marine Ba and organic carbon cycles.

[1] Horner et al., 2015, *EPSL* (430), 511-522. [2] Hsieh and Henderson, 2017, *EPSL* (473) 269-278. [3] Paytan and Kastner, 1996, *EPSL* (142), 439-450. [4] Bates et al., 2017, *GCA* (204), 286-299. [5] Horner et al., 2017, *Nat. Commun.* doi:10.1038/s41467-017-01229-5. [6] Bridgestock et al., 2018, *EPSL* (481) 101-110.