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Rhenium isotope compositions of modern marine sediments

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We present the first stable rhenium isotope data ($\delta^{187}Re$) for modern marine sediments, and provide an important constraint on the oceanic mass balance of Re isotopes.

We present samples from 4 cores taken at various seawater depths on the Namibian Margin in an upwelling zone, in addition to samples from 3 cores obtained from the northern Arabian Sea. Samples from the Namibian margin have Re concentrations between 15 ng g^{-1} and 212 ng g^{-1}, and the Arabian Sea samples have concentrations of 5 to 11 ng g^{-1}. Compared with modern ocean water data – average $\delta^{187}Re$ of -0.17±0.12 ‰ (n=12; [1] – the marine sediments we have analysed have predominantly lighter $\delta^{187}Re$. However, variability within and between cores exceeds analytical uncertainty, and the cause of this heterogeneity is not yet understood. Within the Namibian Margin dataset, lighter $\delta^{187}Re$ compositions are observed in the cores from shallower water depths (< 140 m, average $\delta^{187}Re$ = -0.30±0.14 ‰, n=13) than those from significantly deeper water (> 750 m, average $\delta^{187}Re$ = -0.16±0.15 ‰, n=11). This observation may relate to differences in fractionation processes based on different redox or other geochemical conditions. Understanding the controls on modern marine Re isotopic cycling will help constrain the oceanic mass balance of Re and be of use in future palaeoclimatic investigations.

[1] Dickson, A.J., Hsieh, Y.-T., & Bryan, A., (2020). Geochim. Cosmochim. Acta, New developments in geochemical proxies for paleoceanographic research 287, 221–228.