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Across the sediment water interface: the role of sediment composition on the benthic flux of neodymium

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Neodymium isotopes (ε_{Nd}) are widely used as a tracer of water mass circulation, being thought to behave quasi-conservatively in the ocean. Because of their utility both as a paleoproxy and in the modern ocean as a tracer of natural sources of trace elements and their isotopes to the ocean, neodymium isotopes are recognized as a GEOTRACES key parameter. However, ambiguities in the budget of neodymium and other rare earth elements in today's ocean complicate the interpretation of ε_{Nd}. Recent observations of non-conservative influences, e.g. boundary exchange, along with gaps in the traditional budget have raised concerns over the application of this proxy. Limited observations suggest a sedimentary source of neodymium via a porewater benthic flux is the major source term contributing to boundary exchange, with extrapolated estimates of the magnitude of this flux on the order of magnitude needed to balance the modern oceanic neodymium budget. This means the benthic flux likely exerts significant control over global REE and ε_{Nd} distributions. However, the pore water data necessary to calculate the flux across the sediment-water interface are spatially limited and represent only a small portion of seafloor sediment compositions. Therefore, the factors controlling the magnitude and ε_{Nd} of this source remain poorly constrained preventing confident extrapolation of flux estimates to understand spatial and temporal changes to the flux or how this flux may impact paleo-interpretations. Here, I will present new pore water data with coupled mineralogy from the southern sector of the Pacific Ocean to look at the role of sediment composition as a control of the magnitude and ε_{Nd} of the benthic flux. The sites represent locations above and below the carbonate compensation depth, resulting in sharp changes in sediment composition between sites that are relatively proximal. I'll discuss changes in the estimated size of the benthic flux with changes in water depth and subsequent changes in sediment composition, including discussing the potential role of key sediment components such as biogenic carbonates and authigenic aluminosilicate minerals in controlling the benthic flux.