Uranium recycling along the Namibia Continental Margin

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Authigenic uranium (U) enrichments and their isotope compositions are increasingly important tools for interpreting changes in organic carbon burial and the redox conditions of marine depositional environments. However, their use as paleoproxies requires a detailed understanding of the dominant process that contribute to sediments acquiring their geochemical and isotopic composition.

This study focuses on the U content and isotope composition of organic-rich surface sediments from the Namibian continental margin, where high productivity results in an expanded oxygen minimum zone (OMZ). The investigated sites are located on the shelf, shelf break, and slope where bottom water redox conditions vary from anoxic to suboxic to oxic, respectively. While all cores had relatively high total organic carbon (TOC) contents (ranging from 2 to 12 wt. %), each location displayed a unique U/TOC relationship. Shelf sediment exibited a nearly linear U/TOC ratio while the shelf break and slope sediments showed little to no correlation between U and TOC.

Previous studies in the Namibian continental margin have shown that particle-rich nepheloid layers can rework seafloor sediment, moving organic-rich, uranium-laden deposits from within the OMZ through oxic water to be redeposited on the slope. This lateral movement may result in a release of the reduced U phases back into the water column through oxidation while preserving the organic carbon in the redeposited sediment. In addition to the U concentration, we will present $^{238}U/^{235}U$ isotope compositions to identify the processes responsible for the decoupling of U and TOC under varying bottom water redox conditions.