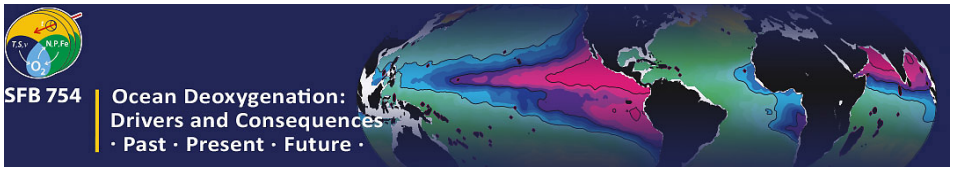

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Radium isotopes as tracers of shelf-derived trace element inputs along the Benguela upwelling zone

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The Benguela region is an eastern boundary upwelling system exhibiting seasonally anoxic conditions. The region receives elemental inputs from aeolian, benthic and riverine sources, such as that from the Congo and Orange Rivers. Continental shelves, at the land-ocean interface, play an important role in marine primary productivity by supplying trace elements such as iron (Fe) and cobalt (Co) and other shelf-derived materials to the ocean. As such, quantifying processes occurring within this land-ocean interface is crucial to understand the biogeochemistry of trace elements and isotopes (TEIs), and the lateral inputs of these elements to the ocean. Radium isotopes (224Ra, 223Ra, 228Ra, and 226Ra) have demonstrated to be powerful tracers of sedimentary inputs of TEIs to the oceans and their off-shelf transport processes. Since Ra isotopes integrate off-shelf transport over broad (week-year) timescales, they can provide important insight into the fraction of TEIs present in relatively TEIs rich waters in ocean margins which are transferred offshore. Here we present the first results from the GEOTRACES section GA08 in the South Atlantic. The aim of this study was to identify processes and quantify fluxes that control the distribution of TEIs in the Benguela Upwelling System. We combine 228Ra fluxes with the distributions of dissolved TEIs to investigate how effectively they are supplied by benthic and riverine sources on the shelf and transferred to the South Atlantic Ocean; thus gaining insight into the spatial scale over which TEIs supply from oxygen-depleted, and TEIs rich waters over the African shelf can facilitate offshore productivity.

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