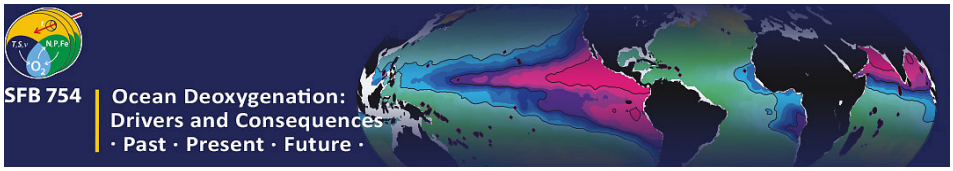


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# Sediment release of dissolved organic matter in the oxygen minimum zone off Peru

Due to upwelling of nutrient-rich waters, the eastern tropical South Pacific (ETSP) represents one of the most productive areas in the ocean. The remineralization of organic matter produced in the euphotic zone and sluggish ventilation lead to the formation of an oxygen minimum zone, where oxygen concentrations fall <1µmol kg-1. Part of particulate organic matter (POM) that originates from the euphotic zone is supplied to the anoxic sediments, where it is degraded by microbial communities. Microbial utilization of organic matter under anoxic conditions leads to nitrogen-loss processes and an accumulation of sulfide and methane.
The degradation of POM gives rise with dissolved organic matter (DOM) production and reworking. DOM may then undergo mineralization processes within the sediment pore waters or diffuse out into the overlying water column. Benthic DOM release can influence the biogeochemistry of overlying water column, as DOM may serve ligands for micronutrients, such as iron, and serve as an additional organic carbon source for microbial communities to respire. The unaccounted release of DOM from pore waters may also lead to underestimations of POM remineralization in the seafloor.
An indication of DOM release from OMZ sediments into the water column was determined during the research cruise M93 to the Peruvian upwelling Feb-March 2013 by high spatial resolution DOM fluorescence (FDOM) measurements. However, the quantification of DOM flux was not possible. Here we present new DOM data from the sediments and the water column, collected during SFB754 research cruises M136-137 to the Peruvian upwelling in 2017. DOM was measured in pore-water samples obtained by a multicorrer (MUC), as well as water samples from sediment incubation (flux) Biogeochemical Observatory chambers (BIGO), and data records, collected by the WETStar CDOM fluorometer (WETLabs, USA) mounted on a mini-lander. We evaluate DOC and dissolved organic nitrogen concentrations and fluxes and compare them to the measurements of FDOM. We discuss the quality of DOM, found in pore waters and in the overlying waters, and possible effects of the DOM release on water column biogeochemistry as well as tracing of the DOM release by in-situ (sensor) measurement techniques.

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