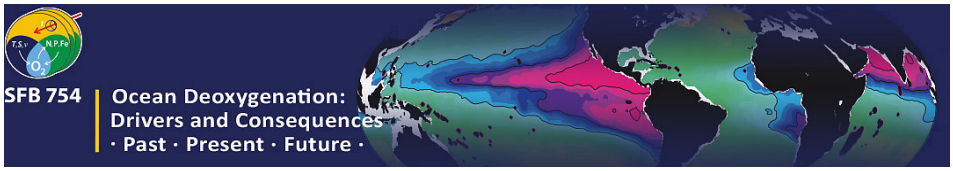

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H2S events in the Peruvian oxygen minimum zone enhances dissolved Fe concentrations

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Dissolved iron (DFe) concentrations in oxygen minimum zones (OMZs) of Eastern Boundary Upwelling Systems are enhanced as a result of high supply rates from anoxic sediments. However, pronounced variaions in DFe concentraions in anoxic coastal waters of the Peruvian OMZ indicate that there are factors in addition to O2 availability that control the cycling of Fe. Our results show that sediment-derived reduced Fe(II) forms the main DFe fraction in the anoxic/euxinic water column off Peru, which is responsible for DFe accumulations of up to 200 nmol L-1. In contrast, lowest DFe values were observed in anoxic shelf waters in the presence of nitrate and nitrite. This reflects oxidation of sediment-sourced Fe(II) associated with nitrate/nitrite reduction and subsequent removal as particulate Fe(III) oxyhydroxides. Unexpectedly, the highest DFe levels were observed in waters with elevated concentrations of hydrogen sulfide (up to 4 µmol L-1) and correspondingly depleted nitrate/nitrite concentrations (< 0.18 µmol L-1). Under these conditions, Fe removal was reduced through stabilization of Fe(II) as aqueous iron sulfide (e.g., FeSH+ and Fe2S2|4H2O). Sulfidic events on the Peruvian shelf enhance Fe availability, and may increase in frequency in the future due to the predicted expansion and intensification of OMZs.

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