Redox cycling of Iron at the Peruvian Margin

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Iron (Fe) is a limiting nutrient in many regions ofthe open ocean and can also play a key role in controlling primary productivity in Eastern Boundary Upwelling Systems (EBUS). In EBUS regions, where intense oxygen minimum zones (OMZs) contact the continental shelf, significant inputs of Fe as Fe(II) from reducing sediments can occur. How much Fe mixes into the photic zone depends on physical mixing and the kinetics of redox and complexation processes. In this presentation we combine observations from the Peru OMZ; (i) *in situ* oxidation rates (Croot et al., 2019) derived from fitting Fe(II) distributions in the water column with a 1D model for Fe(II) release from sediments and (ii) particulate iron speciation in the same region (Heller et al., 2017). Both works suggest that nitrate-dependent anaerobic Fe(II) oxidizing (NDFO) bacteria are the main oxidizers for Fe(II), though H_2O_2 is possibly important even in the core of the OMZ. At the secondary nitrite maxima (SNM), abiotic NO_2^- or biotic-mediated processes may also be important. This work highlights the importance of including iron redox speciation in studies of iron biogeochemical cycling in the ocean.

Croot, P.L., Heller, M.I. and Wuttig, K., 2019. Redox Processes Impacting the Flux of Iron(II) from Shelf Sediments to the OMZ along the Peruvian Shelf. ACS Earth and Space Chemistry.

Heller, M.I. et al., 2017. Accumulation of Fe oxyhydroxides in the Peruvian oxygen deficient zone implies non-oxygen dependent Fe oxidation. Geochimica et Cosmochimica Acta, 211: 174-193.