Linking Trace Metal Geochemistry and Microbial Metagenomics in an Oxygen Minimum Zone

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Microbial biogeochemical cycling in marine oxygen minimum zones (OMZs) may be influenced by the availability of trace metal micronutrients such as Cu (*1, 2*) and Fe. We analyzed the concentration of trace metals (Mn, Fe, Co, Ni, Cu, Zn, Cd) and the speciation of Cu and Fe in the Eastern Tropical North Pacific. Total dissolved metals were generally elevated in the OMZ waters compared to the oxic mixed layer, consistent with previous studies (*3-5*). Cu and Fe, the two metals most likely to be limiting in the marine nitrogen cycle, swapped dominance in oxic and anoxic waters: total dissolved Cu was generally higher in the oxic mixed layer (0.93-1.21 nM Cu vs. 0.04-1.14 nM Fe), whereas Fe was higher in the OMZ (0.90-1.21 nM Cu vs. 0.84-2.09 nM Fe). Conditional stability constants were elevated at all stations and depths (30-500 m, 12.3-12.9 log $K_{Fe'L}$ and 13.9-14.8 log $K_{Cu'L}$). Log $K_{Fe'L}$ values were similar to those measured previously from the ETNP OMZ (12.1-12.8) (*4*), while log $K_{Cu'L}$ values were higher than those measured in the ETSP OMZ (12.5-14.0) (*3*). Metagenomic analysis of genes encoding microbial metalloenzymes is underway. Preliminary results suggest that trace metal bioavailability may correlate with the composition of microbial metallomes in the ETNP OMZ.

[1] S.A. Amin, *et al Limnol. Oceanogr* **58**, 2037-2045 (2013); [2] J. Granger, B.B. Ward, *Limnol. Oceanogr.* **48**, 313-318 (2003). [3] J.E. Jacquot *et al Limnol. Oceanogr* **58**, 1387-1394 (2013). [4] B.M. Hopkinson, K.A. Barbeau, *Marine Chemistry* **106**, 2-17 (2007). [5] J.W. Moffett *et al Deep-Sea Res. Pt. I* **54**, 1341–1349 (2007).