

Pacific Metal Speciation

U.S. GEOTRACES: Pacific Section 1

Statement of Interest

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Proposed work:

We propose to measure dissolved iron (Fe) and copper (Cu) speciation from full water column stations using competitive ligand exchange- adsorptive cathodic stripping voltammetry with the added ligand salicylaldehyde. Buck will analyze Fe speciation following the procedures applied to the North Atlantic section. Randie Bundy, currently a graduate student with Barbeau, will analyze Cu speciation. Both Buck and Bundy have participated in GEOTRACES speciation intercomparison exercises for Fe and Cu, and will inter-compare Fe and Cu speciation on samples collected by Bundy on the upcoming North Atlantic section. Multiple analytical windows will be incorporated into Cu speciation measurements to more thoroughly characterize the ambient ligand pool and facilitate intercomparison of data from past and future studies. Additional samples will be taken for later analysis back in the laboratory to complement shipboard analyses and address any changes in Cu speciation results following storage. The speciation data acquired will be used to test specific hypotheses regarding the distribution of Fe- and Cu-binding organic ligands and the role of ligands in the cycling and bioavailability of these elements.

Justification:

Iron and copper are key trace elements identified by the GEOTRACES Science Plan. Both of these elements are heavily influenced by organic complexation. These ligands appear to control the solubility of Fe and the bioavailability of Cu in the oceans. There is very little data published for Fe or Cu speciation along the proposed Pacific transect and minimal data from below 1000 m in the entire basin. The limited Cu speciation data available from the oligotrophic Pacific (primarily the North Pacific, *e.g.*, Coale and Bruland 1988, Moffett and Dupont 2007) has provided contradicting indications of potential Cu toxicity in subsurface waters. Our proposed studies will thoroughly address this discrepancy along the U.S. GEOTRACES cruise track. In addition, this work will provide further training to an accomplished graduate student and contribute to the development of new investigators trained in GEOTRACES protocols.