

Statement of Interest:

GP15 U.S. Pacific GEOTRACES: The distribution and size partitioning of dissolved micronutrient trace metals (Fe, Cu, Cd, Zn, Mn, and Ni) and Pb

Jessica Fitzsimmons (Texas A&M University) jessfitz@tamu.edu

SCIENTIFIC OBJECTIVES

I plan to submit a proposal to study the full water column distribution of dissolved micronutrient trace metals (Fe, Cu, Cd, Zn, Mn, and Ni) and Pb as well as their size partitioning into soluble and colloidal phases in the Pacific Ocean as part of the summer 2018 US GP15 Pacific GEOTRACES cruise. *Dissolved micronutrient trace metals are key parameters identified by the GEOTRACES Science Plan.* In collaboration with GEOTRACES partners, I intend to use my measured micronutrient distributions to identify potential sources of trace metals to the basin (water masses such as NPIW and some of the oldest waters of thermohaline circulation, equatorial upwelling, lateral inputs from continents, OMZs, hydrothermal inputs, and Asian dust) and to elucidate the effects that these inputs have biological activity, which is known to be limited by micronutrient concentrations in at least the Subarctic and Equatorial Pacific. My multi-element analytical method provides a convenient evaluation of the size partitioning of all seven metals at once.

I intend to further quantify the size partitioning of dissolved trace metals into soluble and colloidal phases because the partitioning of metals influences dissolved/particulate interactions, bioavailability, and residence time. Based on prior research, I expect that the various inputs may have unique partitioning patterns, with implications for the ultimate fate and reactivity of these micronutrient metals within the basin.

Finally, I intend to propose very basic +Fe amendments in surface water incubations across the transect in an effort to evaluate micronutrient concentrations in the lens of overall community Fe stress. I have done this on prior cruises in a very simplified and high-throughput manner, and I anticipate that it will be an excellent scientific addition to the GEOTRACES program with relatively little effort and cost.

ANTICIPATED COLLABORATIONS

I welcome collaborations with any PIs interested in analysis of soluble or colloidal fractions of, for example, metals other than our seven analytes, metal isotopes, metal binding ligands, and synchrotron analysis of colloidal metals at all or a subset of stations. My team would provide ultrafiltered samples for these groups at a subset of stations. I also anticipate close interactions with other groups measuring dissolved metals, including ship-board determinations, and with groups measuring particulate pools and end-member sources of our seven analytes. Finally, I anticipate that there will be interest in the biological community samples collected for incubation analysis, which will be shared with non-GEOTRACES interested groups.