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I plan to submit a proposal to NSF to participate in the US GEOTRACES Peru-Tahiti section to collect plankton cells and particulate samples for determining the trace element content of the plankton communities present along the transect. I plan to focus my analyses on the trace elements listed in Table 2 of the GEOTRACES Science Plan, plus several other bioactive metals (Co, Ni, Mo, V), Si and P. I will be proposing to collect total particulate ( $>0.45\ \mu\text{m}$  Supor membrane) samples from the GO-Flo bottles mounted on the GEOTRACES rosette. I will also propose to collect particulate samples from the same GO-Flo bottles for analysis of plankton element content by x-ray fluorescence. Through the combination of these two approaches I plan to examine the changing trace-element composition of the plankton community (both algal and bacterial) across lateral and vertical gradients in dissolved TEI and nutrient concentrations and redox conditions. In particular, I am interested in responses of the plankton community elemental composition across lateral productivity gradients in the section (from the highly productive eastern boundary upwelling region to the ultra-oligotrophic southeastern Pacific subtropical gyre) and across vertical redox gradients in the region of the oxygen minimum zone (OMZ). Almost all of the redox N transformations that occur in the OMZ are catalyzed by metalloenzymes, and therefore I expect there to be differences in the metal content of the biota that reflect these biological processes. Characterization of the metal content (relative to P and C) of plankton along the transect is needed to parameterize biogeochemical models and also to interpret observations of co-variation of dissolved metals and nutrients in the water column.

I plan to focus my sampling and analyses to the upper 500 m (thus, I will not be proposing to sample the hydrothermal plume for particles via GO-Flo bottles). I propose to collect particles from a single GO-Flo bottle onto a single 25mm  $0.4\text{-}\mu\text{m}$  Supor membrane, as during the US NAGZT cruise. The filtrate from these membranes has been shown to be clean and can be used for analyses of dissolved constituents. In addition to these samples, I proposed to collect 250-mL of unfiltered seawater (from the particle GO-Flo bottle prior to mixing and pressurization) for single-cell analyses via synchrotron x-ray fluorescence.

I expect that this work would require 1-2 berths, depending on collaboration with other groups on sampling and filtration activities. During the US NAGZT cruise we required 1 berth for on-board sample preparation, but we would need a second berth if we were involved in performing GO-Flo filtrations, as well.

I anticipate that this work will benefit from collaboration with (and enable synergies with) other groups studying particles via GO-Flo sampling and in situ pumping. There will also likely be synergies with groups measuring redox transformations in the OMZ (for example, through measurements of  $\text{N}_2\text{O}$  and N isotopes and  $\text{Fe(II)}$ ) and groups measuring sub-micromolar macronutrient concentrations in the surface ocean.