

Statement of Interest for Alaska-Tahiti US GEOTRACES Section Cruise

Trace metal isotopes and concentrations

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We express interest in a joint proposal to measure key TEIs along the section, focusing on concentrations and isotope ratios of the biologically important elements Fe, Ni, Cu, Zn, and Cd. We will explore external sources of these metals to the ocean as well as internal cycling. Sources of interest (especially for Fe) are volcanic ash, hydrothermal vents, dust, and sediments, especially margin sediments in the North and Sub-Arctic Pacific. For the metals with longer residence times, we will investigate the influence of different oxygen regimes (testing the idea that the North Pacific OMZ is a sink for these metals), and the processes which control how the distribution of these metals and their isotopic signatures evolve (and differ from each other) along transport to the old waters of the deep Pacific. This will allow us to more-clearly understand the fundamental processes (scavenging, regeneration) which control the whole-ocean cycling of these metals. Finally, the section offers the opportunity to investigate the biological isotopic fractionation of these metals in surface waters with very different upwelling, nutrient and community regimes.

We thus intend to measure $\delta^{56}\text{Fe}$, $\delta^{60}\text{Ni}$, $\delta^{65}\text{Cu}$, $\delta^{66}\text{Zn}$, and $\delta^{114}\text{Cd}$ on all dissolved samples. We would also obtain high-accuracy concentration data for these TEs as a byproduct of our isotope double-spike technique. We anticipate that other groups will also measure these TE concentrations; however, as key TE concentrations are a core mission of GEOTRACES, duplication will be of immense benefit to the community. We therefore look forward to collaboration with other groups to ensure that data interpretation and authorships on TE concentrations are dealt with in a fair way. We also plan to measure isotopes (especially $\delta^{56}\text{Fe}$) on aerosol and particulate material, and where possible in sediment and porewater samples; here we are very eager to collaborate with the respective sampling teams.