

Particulate Trace Element Speciation

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Statement of interest for US GEOTRACES Pacific Section

I will propose to analyze **dissolved and particulate trace element samples** collected from the GEOTRACES carousel to investigate suspended particulate matter (“SPM”) speciation amongst the biogenic, lithogenic and authigenic phases. I also intend to offer my services as a “Supertech” to deploy the GEOTRACES trace-metal sampling system and collect dissolved and particulate trace elements for the chemical oceanography community.

Sample collection

The GEOTRACES trace-metal clean carousel (“GTC”) allows for the simultaneous collection of both dissolved and SPM samples. While the McLane pumps are better equipped for sampling large volumes of seawater and offer subsamples for distribution to multiple labs, there exists the possibility of spatial and temporal variability between SPM concentrations (collected from the pumps) and the dissolved concentrations (collected from the GTC). The SPM collected from the GTC offers a “bridge” between the two sampling devices, allowing researchers to better compare dissolved and particulate TEI cycles. **I will propose to collect SPM from the GTC using GEOTRACES-approved membrane filters**, with the understanding that I may be called upon to share these samples with other funded participants.

The collection of samples for dissolved TEI analyses requires careful attention and a consideration of “trace-metal consciousness” at all times. I have acted as a GTC “Supertech” on the 2008 and 2009 GEOTRACES intercalibration cruises, as well as the recent 2010 and upcoming 2011 North Atlantic Zonal Transect cruises. **I will propose to participate (and coordinate, if necessary) the collection of dissolved TEI samples** for the chemical oceanography community, including clean van preparation, bottle staging, water budget “balancing,” and the associated record-keeping.

Scientific interest

Marine particles provide a complementary view to dissolved trace element cycles, and can address questions of lateral transport, input (e.g., atmospheric dust, margin resuspension) and removal (e.g., scavenging, biological uptake). **I will propose to analyze SPM samples** by total digestion and subsequent multi-element analysis using ICP-MS. Using published and observed elemental ratios, I will estimate biogenic (vs. P), lithogenic (vs. Ti or Al), and authigenic fractions of the total SPM. Together with the dissolved trace element concentrations (analyzed by ID-ICPMS), I will investigate **the redox cycling of Mn, Fe, Co and Ce in the OMZ near Peru**. By examining the **Eu-anomaly** in SPM, I will trace the extent of **hydrothermal processes** along the East Pacific Rise.

Funding and cruise participation

I will request funding for three years, to include travel expenses for myself and one graduate student to participate in the cruise as part of the GTC sample team (two berths).