

**Letter of Intent for the US GEOTRACES Peru-Tahiti Section:  
The distribution of a suite of dissolved key (Fe, Mn, Zn, Cu, Cd and Pb) and non-key trace metals in the eastern tropical South Pacific from Peru to the East Pacific Rise on the U.S. zonal GEOTRACES transect**

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*Research Goals:*

We propose to investigate the distribution of a suite of trace metals in the eastern tropical South Pacific during the upcoming US GEOTRACES Pacific Zonal Section. This region is of particular interest for two reasons; first, a large gradient in biological productivity and export production exists, ranging from the highly productive eastern boundary current upwelling system off Peru to oligotrophic waters over the East Pacific Rise (EPR). In addition an intense and expanding oxygen minimum zone exists at intermediate depths, ranging from the suboxic waters with denitrification near the coast across a gradient to higher oxygen waters at similar density layers off shore and at deeper and shallower depths. This gradient in productivity and in redox character of the intermediate water will provide an excellent chance to study the influence of productivity and extreme oxygen minimum zones on the distribution of TEIs. The transect will provide a high-resolution spatial sampling across these gradients.

We will analyze eight trace metals (Mn, Fe, Co, Ni, Cu, Zn, Cd and Pb) on UV-oxidized samples using our method developed for GEOTRACES samples (Biller and Bruland, 2011 – in press, Marine Chemistry). We will also analyze twelve trace metals (Y, Cd, La, Pb, Sc, V, Mn, Fe, Ni, Cu, Zn and Ga) with a method recently developed in our lab (Middag, Smith and Bruland, in prep). The key GEOTRACES trace metals (Mn, Fe, Cu, Zn, Cd and Pb) will thus be analyzed by both methods, thus further ensuring an accurate data set for these metals.

*Sample Requirements:*

We require a 0.5 liter dissolved sample from each depth of the vertical profiles obtained with the trace metal GEOTRACES sampling system filtered through the 0.2  $\mu\text{m}$  Acropak capsule. In addition, we will provide our surface GeoFish sampling system and our clean van to obtain high-resolution surface samples along the transect for dissolved and dissolvable (unfiltered acidified samples). This will include surface samples collected along with those for other research groups just prior to arrival or upon departure from each of the vertical profile stations.

*Berth Requirements:*

We require a minimum of one berth for Geoffrey Smith to carry out the clean surface fish sampling efforts. Ideally we would like two berths. The second person would help spell Geoffrey Smith during transects and also be available to help with the clean sampling from the GEOTRACES vertical profiles.

*Anticipated Collaboration and Synergies:*

An intense collaboration will be with Jingfeng Wu who will be focusing on the hydrothermal input of the key trace metals and the mixing of this source out into deep waters of the South Pacific. We have divided our efforts where the Bruland group will focus on the segment between the coastal upwelling off Peru across the productivity and redox gradients to the East Pacific Rise (EPR), while Wu will focus on the segment dealing with the hydrothermal influence from the EPR to the end of the transect near Tahiti. We will overlap and both analyze two vertical profiles to ensure continued agreement of our respective data sets for the suite of common trace metals. We will also be providing large volumes of 0.2  $\mu\text{m}$  filtered or unfiltered clean surface seawater from the GeoFish sampling system to various research groups for aerosol leaching and particulate experiments in addition to potential continuous nutrient monitoring. Finally, we also plan to continue our role in providing dissolved trace metal Reference Samples for the US and international GEOTRACES program and updating the 'consensus values' for a suite of trace metals. These Reference Samples are valuable to work out discrepancies between data sets and will prove valuable when it comes to meshing data sets from various investigators and countries into a unified global data set.