Seawater Dissolved Inorganic and Organic Carbon Measurements for the US GEOTRACES Zonal Peru to Tahiti Section.

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Objectives:

1. Direct determinations of dissolved inorganic carbon (DIC; or total carbon dioxide) and total alkalinity (TA) along the zonal transect from Peru to Tahiti. Samples will be analyzed for DIC/TA using highly precise and accurate techniques (WOCE, CLIVAR-CO_2 repeat, US time-series standard) with samples calibrated with certified reference materials. These data will be used to calculate other parameters such as pH and other seawater carbonate chemistry parameters. These data will provide a thermodynamic context that GEOTRACES PIs can use to help to assess inorganic speciation of many TEIs.

2. Direct measurement of bulk dissolved organic carbon via the high temperature combustion (HTC) will be used to assess vertical and horizontal gradients in the organic carbon field along the Peru – Tahiti section. The HTC technique when calibrated with consensus reference materials provides high quality DOC data (i.e. to CLIVAR, and US time-series standards). These data will also be used to assess variability of DOC within the hydrothermal plume near the East Pacific Rise. The DOC data will be used by GEOTRACES PIs to constrain estimates of trace element complexation and TEI removal processes.

Anticipated Collaborations:

1. We anticipate collaborating with Kristen Buck, Kathy Barbeau and Mac Saito who will propose to examine organic complexation of dissolved Fe, Cu, and Co;
2. Carl Lamborg, Chad Hammerschmidt, and Robert Mason who will propose to examine mercury speciation;
3. Phoebe Lam, Silke Severmann and Brandy Toner who will propose to examine redox speciation and geochemistry of suspended particles;
4. Chris German who will propose to examine organic complexation and associated TEI removal in the hydrothermal plume of the East Pacific Rise.

Sample Requirement: Samples for DIC and TA require approximately 1 L of seawater that will be drawn into ~500 ml glass sample bottles from Niskin samplers on the CTD/rosette. Typically, the DIC/TA samples will be drawn after the DO samples or sampled first on a subsequent cast. We anticipate collection of approximately 900-1200 samples will be collected over complete water column depth for DIC/TA. DOC samples require approximately 100 ml and are typically collected directly after gas sampling by attaching a polycarbonate inline filter cartridge with combusted GF/F filter and gravity filtering sample into 60 ml sample bottles. We will collect DOC samples from every station at all depths sampled.

Berth Requirements: We require one berth to sample both DIC and DOC. Sampling takes approximately 5 minutes per depth.