

Measurement of Fe(II) and sulfide on the GEOTRACES North Pacific Section

Jim Moffett
University of Southern California

Jim Moffett will propose to analyze Fe(II) and sulfide on the Pacific Section from the surface to seafloor. It is anticipated that there will be elevated concentrations of Fe(II) within the oxygen minimum zone and hydrothermal plumes, as well as shallow surface maxima under stratified conditions. Fe(II) will increase the residence time of Fe in zones where it accumulates and it is hypothesized that its presence plays an important role in subsurface Fe transport. Fe(II) will be determined shipboard by the luminol chemiluminescence method developed by Whitney King. A successful intercomparison of this method was carried out in 2008 under the auspices of the GEOTRACES intercomparison exercise between the Barbeau and Moffett labs on the oxygen minimum zone off Southern Mexico.

Sulfide may be present in the oxygen minimum zone based on recent work by Canfield and coworkers suggesting that sulfate reduction may be extant in oxygen minimum zones. While sulfide that is produced may be rapidly reoxidized, it may have an important influence on redox-active metals, including Fe. We plan to assay for sulfide and Fe(II) in the same samples. We plan to determine sulfide by HPLC detection of methylene blue produced in the traditional Cline protocol. Several groups have used this approach to obtain picomolar detection limits. Methylene blue will be preconcentrated at sea for analysis ashore. Application of this approach to the hydrothermal plume may reveal longer-range transport of sulfide than has been observed previously. Reduced sulfur has been detected in particles advected significant distances from ridge sources and may be an important source of dissolved sulfur.