Aerosol and rainfall collection and analysis

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Relevance and research goals: A gradient in the supply of mineral dust to surface waters will be encountered along the Peru to Tahiti section, with greater input near Peru decreasing offshore towards one of the lowest mineral dust deposition areas in the global ocean (Mahowald et al., 2005). An anthropogenic signal from mining/smelting activity in Chile and Peru is also expected inshore. Although globally the atmospheric input off Peru is small, it is likely a very important source of micronutrients to offshore oligotrophic waters where lack of atmospheric Fe input has been suggested to affect diazotroph productivity (e.g. Somes et al., 2010).

Our collaborative proposal will focus on **dry and wet atmospheric deposition** sampling, analysis, and subsample distribution to the community. The collection of aerosol samples is a key component of GEOTRACES sections, as atmospheric deposition represents an important input of TEIs to the remote surface ocean. The key trace elements (Table 2, Science Plan) will be analyzed from bulk and size-fractionated aerosol samples as well as from aerosol leachate. Additional parameters will stem from collaborative efforts. We will propose to work in conjunction with others to characterize atmospheric input, constrain atmospheric input estimates using tracers, and explore the speciation of solubilized metals with a particular focus on Fe and Cu.

Berth Requirements: Two berths will be requested for the sampling and on-board processing of rain and aerosols. These participants would be available to assist sampling the trace metal rosette as was done during the US GEOTRACES Atlantic section.

Sample Requirements: We will require surface water from the towed fish to leach aerosols onboard and provide leach solutions to collaborators. In addition we will request 125 mL subsamples from all trace metal rosette samples and from the towed fish surface samples.

Collaborative studies and synergies:
- The use of the ^{232}Th-^{230}Th pair to trace the supply of dissolved trace metals. (Anderson)
- Iron and copper organic binding ligands in soluble aerosols (Barbeau and Buck)
- Aerosol input of Pb and Po (Baskaran)
- Mercury species in rain water and soluble aerosols (Hammerschmidt, Lamborg, and Mason)
- Nitrogen species in soluble aerosols (Hastings)
- The use of ^{7}Be as a tracer of atmospheric input (Kadko)
- Water soluble organic matter in aerosols (Wozniak)