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I will propose to focus on **aerosol (and rainfall) sampling and analysis**. I will propose to deploy and operate the aerosol and rainfall sampling equipment that I was funded to acquire for the US GEOTRACES program, and to distribute subsamples to the broader TEI “community”.

Parallel high-volume aerosol samplers would be used to collect “total suspended matter” (TSM) aerosol samples onto acid-washed Whatman-41 cellulosic filters and pre-baked quartz micro fiber (QMA) filters on a daily-integrated basis. A third high-volume aerosol sampler will be equipped with a 5-stage Sierra-style slotted impactor to collect size-fractionated aerosols (>7.2 μm , 3.0 μm , 1.5 μm , 0.95 μm , and 0.49 μm) onto Whatman-41 cellulosic filter strips. All aerosol filters will be frozen aboard the ship, and returned to FSU for subsampling in our clean lab. The aerosol system is operated with wind sector and wind speed control to eliminate stack exhaust contamination. The samplers will be deployed on the deck as far forward and as high off the water as possible.

Twin automated rain samplers have been prepared, one for bulk (unfiltered) rainfall, and one equipped for immediate in-line filtration using 47 mm, acid-washed 0.4 μm membrane filters. Their power will also be controlled by wind sector and speed, so that they will not open when stack exhaust is blowing forward. The receiving bottles will be acid-washed low-density polyethylene. The rain samplers will be operated on an “event” basis and samples can be subsampled on the ship (for time-critical TEIs such as N and O isotopes in nitrate, or mercury, or others). Subsamples for anion/cation analysis will be frozen for return to FSU. The remaining sample will be stored frozen or acidified to 0.024M Q-HCl, as appropriate.

I will propose to conduct my own analyses on those samples for ultrapure DI water-soluble and seawater-soluble and residual (water insoluble) aerosol inorganic TEIs, and for bulk (unfiltered) and dissolved (filtered) TEIs in rainfall. I will also volunteer to coordinate the reporting of aerosol and rainfall data to the appropriate data managers, and to coordinate any intercalibration efforts that may be desired. The proposal would be for three years, and would include support for myself (one summer month each year), one graduate student, and partial technician support. I would expect to have one person from my group on the cruise. One person can handle the aerosol and rainfall sampling, and would also be available to assist in some rosette operations and GoFlo subsampling. I expect to request, and possibly help to collect, GoFlo samples for measuring total dissolved Mn, Fe, Co, Ni, Cu, Zn, Cd, and Pb.

We have already distributed aerosol subsamples from the 1st Intercalibration experiment (samples collected on the RSMAS roof in September 2008), and we expect to coordinate the evaluation of those data as they are reported. Between now and the 2010 Atlantic section cruise, we will conduct at least one more aerosol and rainfall chemistry intercalibration experiment (on the 2nd GEOTRACES Intercalibration cruise in the NE Pacific in 2009), and once again distribute subsamples to the aerosol TEI “community” for intercalibration purposes. The goal is to establish appropriate methods for sample collection and subsampling and prepare a sample collection methods “cookbook” for future GEOTRACES cruises. We will compile an appendix of the recipes for sample analysis used by the various laboratories, but since we expect each laboratory to use “best analytical practices”, and because many analytical methods are still being developed and optimized, we do not expect to specify the use of any particular analytical methods.