

Data Management Plan

Introduction:

The Data Management Plan encompasses three areas: use policies, standards, and data preservation and archival. We will leverage existing systems wherever possible. All data will be communicated in a timely fashion following the NSF policy. All data produced during the project will be managed by PI Twining, with the assistance of Co-PI Morton.

Two types of data will be generated in the proposed activities: particulate metal concentrations (mole/L) and cell-specific metal quotas (mole/cell). Particulate trace metal samples will be analyzed by ICPMS, producing vertical profiles of particulate concentrations for a suite of trace elements (Sr, Y, Zr, Mo, Ag, Cd, Ba, La, Ce, Pr, Nd, Sm, Eu, Tb, Dy, Ho, Er, Tm, Yb, Lu, Hf, Pb, Bi, Th, Al, P, S, Ca, Sc, Ti, V, Mn, Fe, Co, Ni, Cu, Zn, and Ga). Cellular concentrations of a subset of these elements (P, Fe, Mn, Co, Ni, Cu, Zn, and also Si) will be measured by SXRF in major taxonomic groups at individual stations and depths.

Data access and sharing policies:

We are committed to making both data types publicly available through peer-reviewed publications and public databases with as few restrictions as possible. Immediately following the cruise, metadata (descriptions and locations of particulate and SXRF samples collected on the cruise) will be shared with cruise leaders for inclusion in the cruise report. As ICPMS and SXRF samples are analyzed (likely to take approximately 1 year following the end of the cruise), data will be processed, and raw and processed data will be uploaded to a networked server maintained by Twining at Bigelow Laboratory and accessible via password-protected access by Morton. This server is backed up regularly and can be accessed by collaborators needing access to the data. Initially, Twining and Morton will have sole access to the data, but data may be shared with other GEOTRACES investigators to facilitate synthesis and intercalibration activities. Data may also be shared with collaborating GEOTRACES investigators using Dropbox (www.dropbox.com), which is secure, convenient and freely available. Data will be transferred to BCO-DMO and the GEOTRACES Data Assembly Center after it has been approved by the GEOTRACES Standards and Intercalibration Committee. Public access will be granted to data following its publication or at most two years after its collection.

Standards and formats to be used for metadata and data:

We will conform to the metadata standards established by the GEOTRACES International Data Assembly Center (<http://www.bodc.ac.uk/geotraces/data/policy/>), in consultation with the Biological and Chemical Oceanography Data Management Office (BCO-DMO). Metadata related to shipboard collection of samples will be managed by the cruise Chief Scientists, as described in the Arctic GEOTRACES management proposal (<http://www.ldeo.columbia.edu/res/pi/geotraces/management2013projectdescriptionArctic.pdf>). The Chief Scientists will be further assisted on-board the ship by the Ocean Data Facility from Scripps Institution of Oceanography. As much as possible, data will be archived in ASCII format, which is the most flexible and readable over the long term. In the case of ICPMS data, calculated particulate trace element concentrations will be reported to BCO-DMO along with detailed information on the number and type of blanks (e.g., analytical instrument blanks, digestion blanks, filter blanks, and process blanks that integrate the entire sample collection,

digestion and analysis process). We will also report concentrations of commercially-available standard reference materials (PACS-2: Marine Sediments for Trace Metals, NRC Canada; BCR-414: Trace elements in plankton, Community Bureau of Reference, Institute for Reference Materials and Measurements, Belgium) that are digested and analyzed in the same batches as the cruise samples. Particular attention will be paid to ensuring that adequate metadata and intercalibration data is supplied to enable outside users to combine data from separate GO-FLO particle analyses into complete water column depth profiles. In the case of the SXRF data, which does not readily conform to existing oceanographic data formats, we are developing our own metadata standards to promote easy and fruitful access to these data. These standards can build on those employed by the national labs. Mean trace element quotas for each plankton group analyzed will be reported, delineated by depth and station, along with the number of cells analyzed, the range and standard deviation of the results

Plans for archiving and preserving data:

Data will be archived at BCO-DMO and the GEOTRACES International Data Assembly Center following approval by the GEOTRACES Standards and Intercalibration Committee.

Additionally, we will establish a server at Bigelow Laboratory for distribution of SXRF spectral data, with metadata and stand-alone IDL Virtual Machine software required for inspection and analysis. This server will be backed up regularly to ensure data safety and integrity. In all our efforts we will work with the Biological and Chemical Oceanography Data Management Office (<http://www.bco-dmo.org>) to archive the data and to ensure our metadata conform to their standards.