

## Data Management Plan

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The participants will adhere to all NSF-OCE data policies on the dissemination and sharing of research results as detailed in this proposal supplement.

### I. Title, contact information, types of data

**A. Project title:** “Collaborative Research: US GEOTRACES GP17-OCE: Size-Fractionated Particle Collection and Analysis from Ultra-Oligotrophic to Antarctic Waters”

**B. Points of contact:** Total size-fractionated particle trace element composition data, filter images, pump-cast metadata, and pump CTD data: Daniel Ohnemus, dan@uga.edu, +1 912-598-2414; Size fractionated weak-leachable particulate trace element and major phase pump particle composition,  $\delta^{13}\text{C}$ -POC,  $\delta^{15}\text{N}$ -PN, and suspended particulate mass: Phoebe J. Lam, pjlam@ucsc.edu, +1 831-459-4587

#### C. Types of data and data descriptions:

**i. Geochemical data and metadata:** We will generate geochemical elemental and isotopic concentration data and particle mass data from marine particle samples. The data will be generated at Skidaway and the University of California, Santa Cruz as described in the project description. Project points of contact, listed above, will ensure that their respective datasets are collected or generated, vetted, disseminated, and archived. Elemental, isotopic, and mass concentration data will be numeric and kept in simple spreadsheet formats. Metadata (data describing methods and protocols) collected alongside pump samples will be similarly kept in ASCII or spreadsheet formats for ease of use during the project and afterwards. We will coordinate with cruise leadership to include cast metadata in cruise reports and work with BCO-DMO (Biological and Chemical Oceanography Data Management Office, bco-dmo.org) to archive and disseminate these data.

**ii. Photographic images and water column optical data:** Images of pump filter membranes and subsamples will be generated during the expedition and made available to collaborators upon request. Optical data from the expedition will include output from particle sensitive CTD sensors at high frequency (4 to 24 Hz depending on cast system). This data will be processed by collaborator James Bishop (UC Berkeley) and returned to PI Ohnemus for archival and dissemination. Expected data collection of images and high-frequency sensor output is expected to be < 50 GB. We will work with BCO-DMO to archive and disseminate these data.

### II. Standards for data and metadata format and content

Analytical data: All sample analyses will be ongoing throughout the project period following procedures outlined in the project description. Data will be archived in a shared cloud drive and on the desktop terminals that operate the analytical instruments. Duplicate files will be created for data analysis to preserve the integrity of the original datasets. Blanks and error/uncertainty

calculations will be rigorously recorded for all concentration data and reported, along with data quality flags for content control, with the final datasets.

Sampling Information: Sampling metadata will be recorded on log sheets at the time of collection, then scanned and archived as images. Metadata will be entered into a spreadsheet format to be stored on a cloud drive ensuring replication of all digital and physical records.

### **III. Policies for Access and Sharing**

The data will be of exclusive use by the PIs until publication or repository archival and release, whichever is first. The PIs will upload processed data files and collection-level metadata to BCO-DMO at the end of the project or once submitted for publication as required by NSF data policies. BCO-DMO will make the datasets publicly available through their system immediately upon receipt and subject to any approved embargo periods related to the expedition itself or the publication process. All project datasets will be connected such that future users can easily access all portions of the dataset(s), in addition to any prior NSF-funded research associated with the PIs and their collaborators.

### **IV. Data Reuse**

We anticipate wide appeal of data and metadata from this project due to the expedition's location in a historically undersampled region. We will maintain links on our institutional websites to the location of the data on BCO-DMO and indicate their availability in our publications. To facilitate tracking of reuse and fair credit to data providers, BCO-DMO will provide a recommended formal citation for the datasets, including persistent identifiers and the contact person's last name.

### **V. Data Preservation and GEOTRACES Data Management Policy**

All investigators who participate in US GEOTRACES cruises must comply with the International GEOTRACES data policy, which is fully compatible with NSF Data policies. Reporting of all appropriate meta-data is required in addition to data submission. Data will be submitted in a timely manner to the BCO-DMO. This office will then submit it to the GEOTRACES International Data Assembly Centre (GDAC) that is at the British Oceanographic Data Centre in Liverpool, UK (<http://www.bodc.ac.uk/geotraces/>), who will be ultimately responsible for the permanent archiving of all GEOTRACES data sets and their distribution. Our data will pass an additional quality test by being evaluated by the International GEOTRACES Standards and Intercalibration Committee (S&IC), which requires demonstration of stringent quality standards, including participation in intercomparison exercises, intercalibration with other laboratories, and routine analysis of reference materials. Co-PI Lam has so far submitted three full particle geochemistry datasets from previous U.S. GEOTRACES cruises (GA03 in 2010/2011, GP16 in 2013, and GN01 in 2015) to BCO-DMO, each consisting of around 50 parameters, each with estimated errors and quality flags. GA03 and GP16 data passed S&IC review and are available in the GEOTRACES Intermediate Data Product 2017. GN01 data are in process for potential inclusion in GEOTRACES Intermediate Data Product 2021.