

Data Management Plan

The speed, signature, & significance of Ba transformations in seawater

Data types

Data will be collected on two types of sample: **survey** and **tracer-incubation**. Survey samples will be comprised of dissolved (SEPR, SO, and ETP) and particulate (SO and ETP) measurements:

- Dissolved samples will be measured for Ba content (reported in nmol L^{-1}) and Ba-isotopic composition (deviation in $^{138}\text{Ba}/^{134}\text{Ba}$ ratio relative to a standard, in ‰).
- Particulate samples from the SO will be collected from GO-FLO bottles onto 47 mm filters (0.4 μm cutoff). Particulate samples from the ETP will be collected using large volume *in situ* filtration—using wire deployed pumps or with AUV *Clio*—and will be collected in two size classes: 0.2–51 μm and >51 μm . We are most interested in the smaller size class, as this contains the vast majority of particulate Ba. Particulate samples will be measured for multi-element chemistry (e.g., Al, Ba, Cd, P, Sr, Ti; reported in pmol L^{-1}) and Ba-isotopic compositions. Filters will be stored frozen and we will take small (3 mm diameter) biopsy punches from filters before imaging using backscatter scanning electron microscopy.

Tracer-incubation samples will be collected from the SO and ETP. Data types will be the same as for particulate samples from the surveys (i.e., multi-element concentrations, Ba-isotopic compositions, and small punches for electron microscopy).

Standards

Multi-element concentrations in particulate samples are calculated using an *external calibration*, performed at least once per analytical session; indium- and blank-corrected ion beam intensities of samples are compared against those of a calibration curve obtained by serial dilution of a multi-element quantification standard. This quantification standard was prepared in-house by mixing single-element standards to mimic the average composition of marine particles. International reference materials—BCR-414 (plankton; *European Commission*), MESS-3 (marine sediment; *National Research Council Canada*), and MAG-1 (marine sediment; *United States Geological Survey*)—are analyzed alongside samples as ‘unknowns’ to ensure that concentrations calculated via our external calibration are within analytical uncertainty (typically $\pm 3\%$ RSD) of certified values.

Barium-isotopic data are reported relative to the NIST SRM 3104a standard, and we routinely process GEOTRACES seawater reference materials SAFe D1, GSP, and GSC alongside unknowns to monitor long-term precision and accuracy of dissolved [Ba] and $\delta^{138}\text{Ba}_{\text{NIST}}$. Since there is no consensus Ba-isotopic reference material for marine particles, we will continue to use JcP-1 (a *Porites* coral powder) as a secondary standard. Barium-isotopic data have been reported for this material by a number of laboratories (see e.g., Geyman et al., 2019).

Data access

We will ensure that all data products are submitted in compliance with NSF OCE policies. Specifically, we intend to submit dissolved and particulate survey data to the *Biological and Chemical Oceanography Data Management Office* (BCO-DMO) within two years of data generation. We will work with BCO-DMO staff to identify the best means to ingest tracer-incubation results and will similarly submit these data within the allowed timeframe.

Archiving

Publications arising from this project will be deposited in both NSF's *Public Access Repository* and a non-typeset version in WHOI's *Open Access Server* (WHOAS)

Lastly, any samples that are not fully consumed in the course of this research will be clearly labeled and archived at WHOI in the GEOSECS warehouse (Quissett North Campus). We will endeavor to honor all reasonable requests from the scientific community for sample material.