

TEI content of phytoplankton and abiotic particles collected from GO-Flo bottles

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Scientific interest

We plan to submit a proposal to NSF to participate in the US GEOTRACES Arctic section to **collect plankton cells and particulate samples** for determining the trace element content of the plankton communities and marine particle assemblages present along the transect. These analyses address several GEOTRACES goals, including fluxes at air-ocean-sediment interfaces and internal cycling (biologic uptake and regeneration).

Analyses of total and labile fractions of TEIs (elements in Table 2 of GEOTRACES Science Plan plus Co, Ni, Mo, V and P) will be performed on particles collected from GO-Flo bottles at **all depths at each station**. We will also propose to collect particulate samples from the same GO-Flo bottles for analysis of plankton element content by x-ray fluorescence. Through the combination of these two approaches we plan to examine the changing **trace-element composition of the phytoplankton community** across lateral and vertical gradients in dissolved TEI and nutrient concentrations in the upper water column of the Arctic. These measurements will be of particular interest over the broad shelves and in areas of significant fluvial inputs. Digestion and analysis of particles from the lower water column and proximal to the sediment-water interface will provide critical information about **fluvial deposition** of TEI to the Arctic shelf, as well as the relative importance of **resuspension versus redox-mobilization** in the transport of TEIs from the shelf to the ocean interior. Additionally, single-cell analyses will be conducted on ice-attached microalgae. Such measurements will help to determine the **factors which control algae growth** in this changing environment, as well as the potential for algal growth to affect TEI cycling. Characterization of the metal content (relative to P and C) of plankton along the transect is needed to parameterize biogeochemical models and also to interpret observations of co-variation of dissolved metals and nutrients in the water column.

Sample collection and water budget

We will propose collecting particles from a single GO-Flo bottle onto a single **25-mm (0.4- μ m pore size) Supor membrane**, as during the US Atlantic and Pacific cruises. The filtrate from these membranes has been shown to be clean and can be used for analyses of dissolved constituents. In addition to these samples, we will propose to collect **1L of unfiltered seawater** (from the particle GO-Flo bottle prior to pressurization) for single-cell analyses via synchrotron x-ray fluorescence.

Berthing

We expect that this work would require **two berths**. These two scientists will be able to conduct all GO-Flo particle filtration in the GEOTRACES clean van, as well as collect samples of membrane-filtered samples for other scientists.

Synergy/collaboration

We anticipate that this work will benefit from collaboration with (and enable synergies with) other groups studying particles via in situ pumping.