

Biogenic silica concentrations collected from CTD casts during RVIB Nathaniel B. Palmer cruise in the Ross Sea, Southern Ocean from 2017-2018

Website: <https://www.bco-dmo.org/dataset/780191>

Data Type: Cruise Results

Version: 1

Version Date: 2019-10-30

Project

» [Collaborative Research: Cobalamin and Iron Co-Limitation Of Phytoplankton Species in Terra Nova Bay \(CICLOPS\)](#)

Contributors	Affiliation	Role
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Abstract

Biogenic silica concentrations collected from CTD casts during RVIB Nathaniel B. Palmer cruise in the Ross Sea, Southern Ocean from 2017-2018

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Coverage

Spatial Extent: N:-72.4481 E:-116.00115 S:-78.6294 W:178.18135

Temporal Extent: 2017-12-31 - 2018-02-19

Dataset Description

Biogenic silica concentrations collected from CTD casts during RVIB Nathaniel B. Palmer cruise in the Ross Sea, Southern Ocean from 2017-2018

Methods & Sampling

Water was collected from varying depths in the photic zone using a CTD. Samples were collected by gentle filtration under low vacuum through 0.6µm polycarbonate filters. Filters were placed in glassine envelopes and dried at 65°C for approximately 24h. For analysis, filters were extracted in 0.2N NaOH for 45 minutes at 95°C. Samples were placed on ice and neutralized with 1N HCl to stop the extraction. Concentrations of silicic acid were determined using the colorimetric method described in Strickland and Parsons, 1972. Precautions were made keep samples contaminant-free, by using plasticware and MilliQ water.

Data Processing Description

Microsoft Excel was used to create standard curves and calculate biogenic silica concentrations

BCO-DMO processing notes:

- Adjusted column header names to fit database system
- Change date format to YYYY-MM-DD to comply with ISO format

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Data Files

File
biogenic_silica.csv (Comma Separated Values (.csv), 22.50 KB) MD5:b5000906be79c7d577095bc1f2e14ef4 Primary data file for dataset ID 780191

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Parameters

Parameter	Description	Units
Date	Date in UTC - format: YYYY-MM-DD	unitless
Station	Station Identifier - Two sets of samples were labeled "Station 52" but were collected from different CTD casts. To clarify this samples from the second cast at station 52 were labeled 52_CTD 53.	unitless
Latitude	Latitude - South is negative	decimal degrees
Longitude	Longitude - West is negative	decimal degrees
Depth	Sample depth	meter (m)
Niskin	Niskin Bottle Identifier	unitless
Fltr_Vol	Volume filtered	liter (l)
Bsi	Concentration of biogenic silica	micromole (μ M)
Sample	Sample number	unitless

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Instruments

Dataset-specific Instrument Name	Shimadzu UV-1601 spectrophotometer
Generic Instrument Name	UV Spectrophotometer-Shimadzu
Dataset-specific Description	A Shimadzu UV-1601 spectrophotometer was used to measure the absorbance of silica standards and samples. A set of seven standards were run with each set of samples and the resulting standard curve was used to quantify the concentration of biogenic silica.
Generic Instrument Description	The Shimadzu UV Spectrophotometer is manufactured by Shimadzu Scientific Instruments (ssi.shimadzu.com). Shimadzu manufacturers several models of spectrophotometer; refer to dataset for make/model information.

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Deployments

NBP1801

Website	https://www.bco-dmo.org/deployment/778919
Platform	RVIB Nathaniel B. Palmer
Report	https://service.rvdata.us/data/cruise/NBP1801/doc/NBP1801DATA.pdf
Start Date	2017-12-16
End Date	2018-03-03
Description	Start Port: Punta Arenas, Chile End Port: Hobart, Australia

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Project Information

Collaborative Research: Cobalamin and Iron Co-Limitation Of Phytoplankton Species in Terra Nova Bay (CICLOPS)

Coverage: Amundsen Sea, Ross Sea, Terra Nova Bay

NSF abstract:

Phytoplankton blooms in the coastal waters of the Ross Sea, Antarctica are typically dominated by either diatoms or *Phaeocystis Antarctica* (a flagellated algae that often can form large colonies in a gelatinous matrix). The project seeks to determine if an association of bacterial populations with *Phaeocystis antarctica* colonies can directly supply *Phaeocystis* with Vitamin B12, which can be an important co-limiting micronutrient in the Ross Sea. The supply of an essential vitamin coupled with the ability to grow at lower iron concentrations may put *Phaeocystis* at a competitive advantage over diatoms. Because *Phaeocystis* cells can fix more carbon than diatoms and *Phaeocystis* are not grazed as efficiently as diatoms, the project will help in refining understanding of carbon dynamics in the region as well as the basis of the food web webs. Such understanding also has the potential to help refine predictive ecological models for the region. The project will conduct public outreach activities and will contribute to undergraduate and graduate research. Engagement of underrepresented students will occur during summer student internships. A collaboration with Italian Antarctic researchers, who have been studying the Terra Nova Bay ecosystem since the 1980s, aims to enhance the project and promote international scientific collaborations.

The study will test whether a mutualistic symbioses between attached bacteria and *Phaeocystis* provides colonial cells a mechanism for alleviating chronic Vitamin B12 co-limitation effects thereby conferring them with

a competitive advantage over diatom communities. The use of drifters in a time series study will provide the opportunity to track in both space and time a developing algal bloom in Terra Nova Bay and to determine community structure and the physiological nutrient status of microbial populations. A combination of flow cytometry, proteomics, metatranscriptomics, radioisotopic and stable isotopic labeling experiments will determine carbon and nutrient uptake rates and the role of bacteria in mitigating potential vitamin B12 and iron limitation. Membrane inlet and proton transfer reaction mass spectrometry will also be used to estimate net community production and release of volatile organic carbon compounds that are climatically active. Understanding how environmental parameters can influence microbial community dynamics in Antarctic coastal waters will advance an understanding of how changes in ocean stratification and chemistry could impact the biogeochemistry and food web dynamics of Southern Ocean ecosystems.

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Funding

Funding Source	Award
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-1644073

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