# 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 |
|---|---|---|
| DiTullio, Giacomo | College of Charleston (CofC) | Principal Investigator |
| Lee, Peter | College of Charleston (CofC) | Co-Principal Investigator |
| Soenen, Karen | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager |

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

## Table of Contents



## 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 0.6um 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

[ table of contents | back to top ]

## Data Files

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

[ table of contents | back to top ]

## Parameters

| Parameter | Description | Units |
|---|---|---|
| Date | Date in UTC - format: YYY-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 (µM) |
| Sample | Sample number | unitless |

[ table of contents | back to top ]

## 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. |

[ table of contents | back to top ]

## 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 |

[ table of contents | back to top ]

## 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.

[ table of contents | back to top ]

## Funding


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


[ table of contents | back to top ]