

# CTD profile casts collected on the RVIB Nathaniel B. Palmer cruise NBP1201 in the Ross Sea from December 2011 to February 2012

**Website:** <https://www.bco-dmo.org/dataset/933216>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2024-08-28

## Project

» [Processes Regulating Iron Supply at the Mesoscale - Ross Sea](#) (PRISM-RS)

## Programs

» [Integrated Marine Biogeochemistry and Ecosystem Research -US](#) (IMBER-US)

» [Ocean Carbon and Biogeochemistry](#) (OCB)

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## Abstract

This dataset of CTD profile casts was collected on the RVIB Nathaniel B. Palmer, cruise ID NBP1201, in the Antarctic. The cruise took place from December 24, 2011 to February 10, 2012, and was conducted as part of the PRISM-RC project, "Processes Regulating Iron Supply at the Mesoscale - Ross Sea".

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## Coverage

**Location:** Ross Sea

**Spatial Extent:** N:-64.237 E:-98.505 S:-77.796 W:164.25

**Temporal Extent:** 2011-12-31 - 2012-02-05

## Methods & Sampling

Standard station CTD profiles were conducted (down casts) with water sampling conducted during the up casts.

This dataset is comprised of the down cast data from station numbers 1-118, except for stations #2 and #100 in which the down casts failed, and thus the upcast data are included instead. Note the CTD fluorescence and oxygen data have **not** been adjusted using the bottle data for chlorophyll and oxygen as a calibration in the final CTD data.

Please disregard station #51 primary oxygen profiles - both voltage and m/L measurements. This was a single cast test comparison, and measurements were taken from another sensor.

## Data Processing Description

Data were processed using the Sea-Bird Software SBE Data Processing, version 7.21k. Data acquisition used SBE Seasave, version 7.14e.

## BCO-DMO Processing Description

- Converted the original file "nbp1201\_ctd\_list.txt" from tab-separated to comma-separated; saved as "nbp1201\_ctd\_list.csv".
- Imported file "nbp1201\_ctd\_list.csv" into the BCO-DMO system.
- Imported the original .cnv files (one per CTD cast; 120 total) into the BCO-DMO system.
- Concatenated the cast files into a single data file.
- Created columns for cruise\_id and station number.
- Changed station 4.2 to 4a in the cast list.
- Joined the cast data to the "nbp1201\_ctd\_list" file by matching on station number.
- Renamed fields to comply with BCO-DMO naming conventions.
- Created date-time field in ISO 8601 format.
- Sorted data by station number.
- Added "down\_or\_up" column to indicate direction of cast.
- Replaced values at station 51 in the sbeox0V (raw primary O2) and sbeox0ML\_L (dissolved primary O2) columns with the bad data flag "-9.990e-29".
- Saved the final file as "933216\_v1\_nbp1201\_ctd.csv".

## Problem Description

Bad data are indicated by a value of -9.990e-29.

Station 51 primary oxygen measurements (both voltage and m/L measurements) failed and have been replaced with the bad data flag.

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## Data Files

**File****933216\_v1\_nbp1201\_ctd.csv**(Comma Separated Values (.csv), 17.96 MB)  
MD5:dcf7408b6b402a162adba43963e3e407

Primary data file for dataset ID 933216, version 1

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<b>Parameter</b>	<b>Description</b>	<b>Units</b>
cruise_id	Cruise ID number	unitless
station	Station number	unitless
ISO_DateTime_UTC	Date and time (UTC) in ISO 8601 format	unitless
year	NMEA UTC year	unitless
month	NMEA UTC month	unitless
day	NMEA UTC day	unitless
hour	NMEA UTC hour	unitless
minute	NMEA UTC minute	unitless
second	NMEA UTC second	unitless
latitude	NMEA latitude; negative values = South	decimal degrees
longitude	NMEA longitude; negative values = West	decimal degrees
timeS	Elapsed time	seconds
prDM	Pressure, Digiquartz	decibars (db)
t090C	Temperature from primary sensor, ITS-90	degrees Celsius
t190C	Temperature from secondary sensor, ITS-90	degrees Celsius

c0S_m	Conductivity from primary sensor	siemens per meter (S/m)
c1S_m	Conductivity from secondary sensor	siemens per meter (S/m)
fIECO_AFL	Fluorescence, WET Labs ECO-AFL/FL	milligrams per cubic meter (mg/m <sup>3</sup> )
xmiss	Percent Beam Transmission, Chelsea/Seatech	unitless (percent)
altM	Altimeter	meters (m)
par	PAR/Irradiance, Biospherical/Licor	microEinsteins per square meter per second (uE/m <sup>2</sup> /s)
cpar	CPAR/Corrected Irradiance (%)	unitless (percent)
spar	SPAR/Surface Irradiance	microEinsteins per square meter per second (uE/m <sup>2</sup> /s)
sbeox0V	Oxygen raw from primary sensors, SBE 43	volts (V)
sbeox1V	Oxygen raw from secondary sensors, SBE 43	volts (V)
potemp090C	Potential temperature from primary sensors, ITS-90	degrees Celsius
potemp190C	Potential temperature from secondary sensors, ITS-90	degrees Celsius
sbeox0ML_L	Dissolved oxygen concentration from primary sensor, SBE 43	milliliters per liter (mL/L)
sbeox1ML_L	Dissolved oxygen concentration from secondary sensor, SBE 43	milliliters per liter (mL/L)
sal00	Practical salinity, from primary sensors	PSU
sal11	Practical salinity, from secondary sensors	PSU
sigma_e00	Sigma-theta density from primary sensors	kilograms per cubic meter (kg/m <sup>3</sup> )
sigma_e11	Sigma-theta density from secondary sensors	kilograms per cubic meter (kg/m <sup>3</sup> )
flag	Bad data flag (-9.990e-29)	unitless

cnv_file_name	Original name of .cnv file	unitless
down_or_up	Indicates if the data are from an upcast or downcast of the CTD. (During stations 2 and 100, the downcasts failed, and thus the upcast data are included instead.)	unitless

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## Instruments

<b>Dataset-specific Instrument Name</b>	LI-COR Biospherical SPAR Sensor
<b>Generic Instrument Name</b>	Biospherical PAR sensor
<b>Dataset-specific Description</b>	The LI-COR Biospherical SPAR Sensor is used to measure Surface Photosynthetically Available Radiation (SPAR).
<b>Generic Instrument Description</b>	Unspecified Biospherical PAR. An irradiance sensor, designed to measure Photosynthetically Active Radiation (PAR).

<b>Dataset-specific Instrument Name</b>	CTD Sea-Bird 911
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Dataset-specific Description</b>	SeaBird 911+ Rosette 24-position, 10-liter bottle Rosette with dual T/C sensors At each station, CTD casts measured temperature, salinity and PAR. Water samples collected at depths of 500, 300, 250, 200, 150, 120, 100, 80, 60, 40, 30, 20, 10 m, and the surface were filtered, processed or preserved for further analysis.
<b>Generic Instrument Description</b>	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

<b>Dataset-specific Instrument Name</b>	LI-COR Biospherical PAR Sensor
<b>Generic Instrument Name</b>	LI-COR Biospherical PAR Sensor
<b>Generic Instrument Description</b>	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

<b>Dataset-specific Instrument Name</b>	Pressure, Digiquartz with TC
<b>Generic Instrument Name</b>	Pressure Sensor
<b>Generic Instrument Description</b>	A pressure sensor is a device used to measure absolute, differential, or gauge pressures. It is used only when detailed instrument documentation is not available.

<b>Dataset-specific Instrument Name</b>	SBE 43 Dissolved Oxygen
<b>Generic Instrument Name</b>	Sea-Bird SBE 43 Dissolved Oxygen Sensor
<b>Generic Instrument Description</b>	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics

<b>Dataset-specific Instrument Name</b>	Wet Labs ECO-AFL/FL Fluorometer
<b>Generic Instrument Name</b>	Wet Labs ECO-AFL/FL Fluorometer
<b>Generic Instrument Description</b>	The Environmental Characterization Optics (ECO) series of single channel fluorometers delivers both high resolution and wide ranges across the entire line of parameters using 14 bit digital processing. The ECO series excels in biological monitoring and dye trace studies. The potted optics block results in long term stability of the instrument and the optional anti-biofouling technology delivers truly long term field measurements. more information from Wet Labs

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## Deployments

### NBP1201

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/506350">https://www.bco-dmo.org/deployment/506350</a>
<b>Platform</b>	RVIB Nathaniel B. Palmer
<b>Report</b>	<a href="http://data.bco-dmo.org/PRISM/PRISM_cruise_report_draft_feb_12.pdf">http://data.bco-dmo.org/PRISM/PRISM_cruise_report_draft_feb_12.pdf</a>
<b>Start Date</b>	2011-12-24
<b>End Date</b>	2012-02-11
<b>Description</b>	From McMurdo Station to Punta Arenas, Chile More information from R2R: <a href="https://www.rvdata.us/search/cruise/NBP1201">https://www.rvdata.us/search/cruise/NBP1201</a>

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## Project Information

### Processes Regulating Iron Supply at the Mesoscale - Ross Sea (PRISM-RS)

**Website:** [http://science.whoi.edu/users/olga/PRISM\\_RS/PRISM\\_RS.html](http://science.whoi.edu/users/olga/PRISM_RS/PRISM_RS.html)

**Coverage:** Ross Sea continental shelf; Southern Ocean

The NSF proposal title was "Impact of Mesoscale Processes on Iron Supply and Phytoplankton Dynamics in the Ross Sea"

The Ross Sea continental shelf is one of the most productive areas in the Southern Ocean, and may comprise a significant, but unaccounted for, oceanic CO<sub>2</sub> sink, largely driven by phytoplankton production. The processes that control the magnitude of primary production in this region are not well understood, but data suggest that iron limitation is a factor. Field observations and model simulations indicate four potential sources of dissolved iron to surface waters of the Ross Sea: (1) circumpolar deep water intruding from the shelf edge; (2) sediments on shallow banks and nearshore areas; (3) melting sea ice around the perimeter of the polynya; and (4) glacial meltwater from the Ross Ice Shelf. The principal investigators hypothesize that hydrodynamic transport via mesoscale currents, fronts, and eddies facilitate the supply of dissolved iron from these four sources to the surface waters of the Ross Sea polynya. These hypotheses will be tested through a combination of in situ observations and numerical modeling, complemented by satellite remote sensing. In situ observations will be obtained during a month-long cruise in the austral summer. The field data will be incorporated into model simulations, which allow quantification of the relative contributions of the various hypothesized iron supply mechanisms, and assessment of their impact on primary production. The research will provide new insights and a mechanistic understanding of the complex oceanographic phenomena that regulate iron supply, primary production, and biogeochemical cycling. The research will thus form the basis for predictions about how this system may change in a warming climate. The research will contribute to the goals of the international research programs ICED (Integrated Climate and Ecosystem Dynamics) and GEOTRACES (Biogeochemical cycling and trace elements in the marine environment).

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## Program Information

### Integrated Marine Biogeochemistry and Ecosystem Research -US (IMBER-US)

**Website:** <http://www.imber.info/>

**Coverage:** global

The BCO-DMO database includes data from IMBER endorsed projects lead by US funded investigators. There is no dedicated US IMBER project or data management office. Those functions are provided by US-OCB and BCO-DMO respectively.

The information in this program description pertains to the Internationally coordinated IMBER research program. The projects contributing data to the BCO-DMO database are those funded by US NSF only. The full IMBER data catalog is hosted at the Global Change Master Directory (GCMD).

**IMBER Data Portal:** The IMBER project has chosen to create a metadata portal hosted by the NASA's Global Change Master Directory (GCMD). The GCMD IMBER data catalog provides an overview of all IMBER endorsed and related projects and links to datasets, and can be found at URL <http://gcmd.nasa.gov/portals/imber/>.

IMBER research will seek to identify the mechanisms by which marine life influences marine biogeochemical cycles, and how these, in turn, influence marine ecosystems. Central to the IMBER goal is the development of a predictive understanding of how marine biogeochemical cycles and ecosystems respond to complex forcings, such as large-scale climatic variations, changing physical dynamics, carbon cycle chemistry and nutrient fluxes, and the impacts of marine harvesting. Changes in marine biogeochemical cycles and ecosystems due to global change will also have consequences for the broader Earth System. An even greater challenge will be drawing together the natural and social science communities to study some of the key impacts and feedbacks between the marine and human systems.

To address the IMBER goal, four scientific themes, each including several issues, have been identified for the

IMBER project: Theme 1 - Interactions between Biogeochemical Cycles and Marine Food Webs; Theme 2 - Sensitivity to Global Change: How will key marine biogeochemical cycles, ecosystems and their interactions, respond to global change?; Theme 3 - Feedback to the Earth System: What are the roles of the ocean biogeochemistry and ecosystems in regulating climate?; and Theme 4 - Responses of Society: What are the relationships between marine biogeochemical cycles, ecosystems, and the human system?

## Ocean Carbon and Biogeochemistry (OCB)

**Website:** <http://us-ocb.org/>

**Coverage:** Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO<sub>2</sub> and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

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## Funding

Funding Source	Award
<a href="#">NSF Antarctic Sciences (NSF ANT)</a>	<a href="#">ANT-0944165</a>

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