Nutrients and chlorophyll from sea water samples collected in the Ross Sea from 2013-2015 (Ross Sea Microb Ecophys project)

Website: https://www.bco-dmo.org/dataset/628244
Version: 2015-12-14

Project
» Synergistic Effects of Iron, Carbon Dioxide and Temperature on the Fate of Nitrate: Implications for Future Changes in Export Production in the Southern Ocean (Ross_Sea_Microb_Ecophys)

Contributors	Affiliation	Role
Bronk, Deborah A.	Virginia Institute of Marine Science (VIMS)	Principal Investigator
Sipler, Rachel E.	Virginia Institute of Marine Science (VIMS)	Principal Investigator
Allen, Andrew E.	J. Craig Venter Institute (JCVI)	Co-Principal Investigator
Hutchins, David A.	University of Southern California (USC-WIES)	Co-Principal Investigator
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

Water was pumped to the surface using a trace metal clean diaphragm pump and acid cleaned teflon tubing and dispensed into trace metal clean (TMC) 50 L carboys. Sampling occurred between 18:00 and 19:00 in open air, with wind coming strictly from over open water, NNE to NE. The carboys were protected from light with dark plastic bags and returned to the Crary Laboratory at McMurdo Station via helicopter within one hour of sampling.

Chl *a* was measured using 90% acetone extracts and the non-acidified fluorometric method, employing a Turner Designs fluorometer and Whatman GF/F filters.

Nitrate (NO_3^-), nitrite (NO_2^-), phosphate (PO_4^{3-}) and silicate (SiO_4) concentrations were measured in duplicate on a Lachat QuikChem 8500 autoanalyzer. Ammonium (NH_4^+) concentrations were measured in triplicate using the phenol-hypochlorite method.

Methods & Sampling

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Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- changed date format from m/d/yyyy to yyyy-mm-dd
- converted latitude and longitude from degree-decimal minutes to decimal degrees

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Data Files

File
nuts_McMurdo.csv (Comma Separated Values (.csv), 735 bytes) MD5:b5fe8c9b7cbd6cf3fce0033c533faf74 Primary data file for dataset ID 628244

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Parameters

Parameter	Description	Units
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
date_local	local date	yyyy-mm-dd
depth	sample depth	meters
chl_a	mean chlorophyll-a concentration	ug/liter
chl_a_stdev	mean chlorophyll-a concentration error	ug/liter
NH4	mean ammonium concentration	umol N/liter
NH4_stdev	mean ammonium concentration standard deviation	umol N/liter
NO3	mean nitrate concentration	umol N/liter
NO3_stdev	mean nitrate concentration standard deviation	umol N/liter
NO2	mean nitrite concentration	umol N/liter
NO2_stdev	mean nitrite concentration standard deviation	umol N/liter
Urea	mean urea concentration	umol N/liter
Urea_stdev	mean urea concentration standard deviation	umol N/liter
PO4	mean phosphate concentration	umol P/liter
PO4_stdev	mean phosphate concentration standard deviation	umol P/liter
SiO4	mean silicate concentration	umol Si/liter
SiO4_stdev	mean silicate concentration standard deviation	umol Si/liter

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Fluorometer
Dataset-specific Description	Turner Designs fluorometer
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	
Generic Instrument Name	Nutrient Autoanalyzer
Dataset-specific Description	Lachat QuikChem 8500 autoanalyzer
Generic Instrument Description	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

Dataset-specific Instrument Name	
Generic Instrument Name	Pump
Dataset-specific Description	Trace metal clean diaphragm pump
Generic Instrument Description	A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps

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Deployments

helicopter_Allen

Website	https://www.bco-dmo.org/deployment/628276
Platform	McMurdo Station
Start Date	2013-01-16
End Date	2015-01-23
Description	Water sample collections in the Ross Sea

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Project Information

Synergistic Effects of Iron, Carbon Dioxide and Temperature on the Fate of Nitrate: Implications for Future Changes in Export Production in the Southern Ocean (Ross_Sea_Microb_Ecophys)

Coverage: McMurdo Sound of the Ross Sea

Description from NSF award abstract:
This award provides support for "Collaborative Research: Synergistic Effects of Iron, Carbon Dioxide, and Temperature on the Fate of Nitrate: Implications for Future Changes in Export Production in the Southern Ocean" from the Antarctic Organisms and Ecosystems program in the Office of Polar Programs at NSF. The project will use a novel combination of research approaches to evaluate the effects of temperature, carbon dioxide, and iron on three ecologically- and biogeochemically-critical Southern Ocean phytoplankton functional groups: Large centric diatoms, small pennate diatoms, and Phaeocystis antarctica.

The Southern Ocean around Antarctic is undergoing several changes including increased temperature and carbon dioxide content, as well as changing levels of biologically available iron. The project goals are to understand how the individual and combined influences of these three variables affect Southern Ocean phytoplankton community structure, and to determine how these assemblage-level responses are linked to fundamental cellular responses at the levels of nutrient physiology and gene expression. The research team will focus on three different types of marine algae: large and small diatoms, and the prymnesiophyte, Phaeocystis antarctica. Shifts between these three major algal groups have very different consequences for nutrient and carbon biogeochemistry in the rapidly changing Antarctic marine environments. However, the mechanistic underpinnings of these environmentally-driven community shifts are not known. The project includes a US-based laboratory component with Antarctic isolates, field study at McMurdo Station, and then a cruise of opportunity in the upwelling areas directly south of the Antarctic Circumpolar Current. The study also includes collection and analysis of environmental gene expression data, or meta-transcriptomics, both from the field and experimental settings. The transcriptomes will be generated under environmentally relevant conditions and will thus contain information critical for decoding the genomes of several newly sequenced polar phytoplankton species in addition to the three groups highlighted above.

Related publications:
Bertrand, E.M., McCrow, J.P., Moustafa, A., Zheng, H., McQuaid, J., Delmont, T., Post, A.F., Sipler, R., Spackeen, J.L., Xu, K., Bronk, D.A., Hutchins, D.A., Allen, A.E. 2015. Phytoplankton-bacterial interactions mediate micronutrient colimitation at the coastal Antarctic sea ice edge. Proceedings of the National Academy of Sciences. 10.1073/pnas.1501615112

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Funding

Funding Source	Award
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	PLR-1043748