Water column nutrient data from RV/Neil Armstrong cruise AR16, May 2017

Website: https://www.bco-dmo.org/dataset/762849
Data Type: Cruise Results
Version: 1
Version Date: 2019-03-21

Project
» Redox Cycling of Phosphorus in the Western North Atlantic Ocean (Phosphorus Redox Cycling)

Contributors	Affiliation	Role
Van Mooy, Benjamin A.S.	University of Rhode Island (URI-GSO)	Principal Investigator
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This dataset includes water column nutrient data from RV/Neil Armstrong cruise AR16, May 2017: silicate, nitrate, nitrite, and ammonium concentrations.

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Coverage

Spatial Extent: **N**:40.59278 **E**:-64.44075 **S**:29.16425 **W**:-71.21921
Temporal Extent: 2017-05-04 - 2017-05-20

Dataset Description

This dataset includes water column nutrient data from RV/Neil Armstrong cruise AR16, May 2017: silicate, nitrate, nitrite, and ammonium concentrations.

Methods & Sampling

Sampling was conducted aboard the R/V Neil Armstrong during a cruise in May 2017. Seawater was collected from Niskin bottles deployed on a rosette with a CTD. Samples were pre-filtered through a 0.2 micrometer filter into a 50 mL Falcon tube and frozen at -20 degrees C. Samples were shipped frozen to the University of Washington Marine Chemistry Laboratory. Samples were analyzed on a Technicon AAII Autoanalyzer.

Analytical methods (from https://www.ocean.washington.edu/story/Marine+Chemistry+Laboratory):

Analysis	Method Reference	EPA/SM#	MELAC Code
PO4	UNESCO(1994)	EPA 365.5_1.4_1997	WM920270
Si(OH)4	UNESCO(1994)	EPA 366	WM920240
NO3	UNESCO(1994)	EPA 353.4_2_1997	10068209
NO2	UNESCO(1994)	EPA 353.4_2_1997	10068209
NH4	UNESCO(1994)	EPA 349	WM920220

Data Processing Description

BCO-DMO Processing:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- re-formatted date from m/d/yyyy to yyyy-mm-dd
- added lat and lon for each cast from data provided in dataset AR16_Water_Column, id#754508

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Data Files

File
AR16_water_column_nutrients.csv (Comma Separated Values (.csv), 3.27 KB) MD5:1b1ee636d9c7f67d563bdadc10c75c18 Primary data file for dataset ID 762849

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Related Publications

Knap, A. H., Michaels, A., Close, A. R., Ducklow, H., & Dickson, A. G. (1996). Protocols for the joint global ocean flux study (JGOFS) core measurements. http://hdl.handle.net/10013/epic.27912
Methods

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Parameters

Parameter	Description	Units
Date	UTC sampling date formatted as yyyy-mm-dd.	unitless
Depth	Depth at which the samples were collected.	meters
Station	Numeric identifier for the station where the data was collected.	unitless
CTD_Cast	Numeric identifier for the CTD cast where the data was collected.	unitless
PO4	Phosphate concentration.Samples were NOT pre-concentrated with MAGIC; bdl = 0.014 umol per liter	umol per liter
Silicate	Silica concentration; bdl = 0.23 umol per liter	umol per liter
NO3	Nitrate concentration; bdl = 0.288 umol per liter	umol per liter
NO2	Nitrite concentration; bdl = 0.011 umol per liter	umol per liter
NH4	Ammonium concentration; bdl = 0.047 umol per liter	umol per liter
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD - profiler
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934.

Dataset-specific Instrument Name	
Generic Instrument Name	Niskin bottle
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

Dataset-specific Instrument Name	Technicon AAII Autoanalyzer
Generic Instrument Name	Nutrient 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.

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Deployments

AR16

Website	https://www.bco-dmo.org/deployment/747056
Platform	R/V Neil Armstrong
Start Date	2017-05-03
End Date	2017-05-22

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Project Information

Redox Cycling of Phosphorus in the Western North Atlantic Ocean (Phosphorus Redox Cycling)

Coverage: western north Atlantic

NSF Award Abstract:

Redox Cycling of Phosphorus in the Western North Atlantic Ocean
Benjamin Van Mooy
ID: 1536346

Understanding controls on the growth of plankton in the upper ocean, which plays an essential role in the sequestration of carbon dioxide, is an important endeavor for chemical oceanography. Phosphorus is an essential element for marine plankton, and has been a research focus of chemical oceanography for nearly a century. Yet, phosphorus redox cycling rates are almost completely unknown throughout the ocean, and the

specific molecular identities of the phosphonates, a form of phosphate, in seawater have defied elucidation. This project will explore and refine entirely new pathways for the biological cycling of phosphorus. This project will support teaching and learning by funding the PhD research of a graduate student, and through the continuation of conducting K-12 classroom laboratory modules and hosting 6-8th grade science fair participants in the investigator's lab.

Phosphorus has never been viewed by oceanographers as an element that actively undergoes chemical redox reactions in the water column, and it was believed to occur only in the +5 valence state, in compounds such as phosphate. However, over the last 17 years, numerous lines of geochemical and genomic information have emerged to show that phosphorus in the +3 valence state (P(+3)), particularly dissolved phosphonate compounds, may play a very important role within open ocean planktonic communities. This is particularly true in oligotrophic gyres such as the Sargasso Sea, where growth of phytoplankton can be limited by the scarcity of phosphate. To better understand these new data, the investigators will design and execute a research program that spans at-sea chemical oceanographic experimentation, state-of-the-art chromatography and mass spectrometry, and novel organic synthesis of 33P-labeled P(+3) compounds. Specifically, they will answer questions about rates of production and consumption of low molecular weight P(+3) compounds, the impact of phosphate availability on the production and consumption of P(+3) compounds, and the groups of phytoplankton that utilize low molecular weight P(+3) compounds. Results of this project have the potential to contribute to the transformation of our understanding of the marine phosphorus cycle.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1536346

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