Bottle profile data from the R/V Neil Armstrong cruise AR16 in the Western North Atlantic Ocean from 2017-05-04 to 2017-05-20

Website: https://www.bco-dmo.org/dataset/747267
Data Type: Cruise Results
Version: 1
Version Date: 2018-09-21

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

Contributors	Affiliation	Role
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Abstract
Bottle profile data from the R/V Neil Armstrong cruise AR16 in the Western North Atlantic Ocean from 2017-05-04 to 2017-05-20.

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Coverage

Spatial Extent: **N**:40.4217 **E**:-64.162 **S**:29.0308 **W**:-71.4208
Temporal Extent: 2017-05-04 - 2017-05-20

Dataset Description

SeaBird 911+ bottle processed data.

Methods & Sampling

Standard CTD data collection using the Seabird software.

AR16 CTD Data collection notes.

Casts 1-10 - PAR sensor calibration numbers incorrect in .xmlcon files for each cast #

Casts 1-4 - collected with ar16_initial.xmlcon (data values really wrong)

Casts 5-10 - collected with ar16_test.xmlcon - data close, but not using the correct cal coefficients for surface

par

Casts 11 --> onward collected with ar16.xmlcon - data correct, real calibration numbers.

***** all casts processed with the correct configuration file and calibration coefficients. The originally collected cast-associated .XMLCON files have not been deleted, but are incorrect as above for the first ten casts. If reprocessing done, use ar16.xmlcon.*****

APPROPRIATE REPROCESSING CONFIGURATION FILES AND CAST #S.
After cast 11, the associated cast# .xmlcon file is correct. Also:

ar16_casts1to47.xmlcon
ar16_casts48to60.xmlcon
ar16_casts61plus.xmlcon

can be used for the various cast ranges.

After cast 39 - changed pump on primary side to alleviate sensor clogging issues that showed up in oxygen and conductivity.

Perhaps cast 39 not ended? The .bl file time did not end until the next cast started. Replaying the cast shows the bottles firing nevertheless.

Fluorometer (FLNTURTD) started to exhibit strange drift characteristics, trending negative data, and a regular voltage spike pulse around cast 34. After troubleshooting, the cause was determinted to be failing voltage channels 0-1. The FLNTURTD (voltage 0-1) and transmissometer (voltage 2-3) cables were swapped on the 9plus CTD voltage channels after cast 47. This fixed the FLNTURTD instrument. The transmissometer was not removed from the package until after cast 60. The intervening transmissometer data should not be trusted.

Late in the cruise, the fluorometer started showing regular spiked data again (no drift). The problem was determined to be a faulty cable. As there was a no spare cable aboard for the FLNTURTD, but there was a spare cable on board for the ECO-AFL - the last three casts contain fluorometer data but none from the turbidity channel.

A zipped package of all the raw ctd and bottle data, along with the processed data and notes can be found at this link (172 MB) http://datadocs.bco-dmo.org/docs/Phosphorus_Redox_Cycling/data_docs/ar16.zip.

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.
- Reformatted dates to ISO0861 convention.
- Appended latitude/longitude information.
- Appended cast direction information.

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Data Files

File
bottle.csv (Comma Separated Values (.csv), 464.91 KB) MD5:d4bab1fc90464cb09c6b02d9f6dcec59 Primary data file for dataset ID 747267

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Parameters

Parameter	Description	Units
Bottle	bottle number	unitless
C0S_m	conductivity	Seimens per meter (S/m)
C1S_m	conductivity 2	Seimens per meter (S/m)
CStarAt0	Beam Attenuation	per meter (1/m)
CStarTr0	Beam Transmission	percent (%)
Cpar	CPAR/Corrected Irradiance	percent (%)
Date	date and time of observation	unitless
Density00	density	kilograms per cubic meter (kg/m^3)
Density11	density 2	kilograms per cubic meter (kg/m^3)
FlECO_AFL	Fluorescence	miligrams per cubic meter (mg/m^3)
OxsatMm_Kg	Oxygen	milimeters per kilogram (mm/kg)
Par	PAR/Irradiance	watts per meter squared (W/m2)
Potemp090C	Potential Temperature	degrees Celsius
Potemp190C	Potential Temperature 2	degrees Celsius
PrDM	Pressure	decibars (db)
Sal00	salinity	Practical Salinity Units (PSU)
Sal11	salinity	Practical Salinity Units (PSU)
sbeox0Mm_Kg	Oxygen	mm/kg
Sbeox0V	Oxygen voltage	volts
Sigma_e00	density sigma-theta	kilograms per cubic meter (kg/m^3)
Sigma_e11	density 2 sigma-theta	kilograms per cubic meter (kg/m^3)
Spar	SPAR/Surface Irradiance	watts per meter squared (w/m2)
SvCM	sound velocity	meters per second (m/s)
SvCM1	sound velocity 2	meters per second (m/s)
T090C	Temperature	degrees Celsius
T190C	Temperature 2	degrees Celsius
TurbWETntu0	turbidity	NTU
lat	latitude in degrees north	decimal degrees
lon	longitude in degrees east	decimal degrees
start_time	time the profile was started in ISO0861 format	unitless

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Instruments

Dataset-specific Instrument Name	bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	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.

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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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