CTD 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/747051
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
CTD 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**:40.421667 **E**:-64.162 **S**:29.030833 **W**:-71.420833
Temporal Extent: 2017-05-04 - 2017-05-20

Dataset Description

SeaBird 911+ CTD processed data.

Acquisition Description

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 fluoromter 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 fluoromter 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.

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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Parameters

Parameter	Description	Units
CStarAt0	Beam Attenuation WET Labs C-Star	per meter (1/m)
CStarTr0	Beam Transmission WET Labs C-Star	percent (%)
c0S_m	Conductivity	Seimens per meter (S/m)
c1S_m	Conductivity 2	Seimens per meter (S/m)
cast_dir	Cast Direction (up or down)	unitless
cpar	CPAR/Corrected Irradiance	percent (%)
depSM	Depth	meter (m)
flECO_AFL	Fluorescence WET Labs ECO-AFL/FL	miligrams per cubic meter (mg/m^3)
flag	flag (bad_flag = -9.990e-29)	unitless
par	PAR/Irradiance Biospherical/Licor	watts per meter squared (W/m2)
prDM	Pressure Digiquartz	decibars (db)
sal00	Salinity Practical	Practical Salinity Units (PSU)
sal11	Salinity Practical 2	Practical Salinity Units (PSU)
sbeox0ML_L	Oxygen SBE 43	mililiters per liter (ml/l)
sbeox0V	Oxygen raw SBE 43	volts (V)
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 Chen-Millero	meters per second (m/s)
t090C	Temperature ITS-90	degrees Celsius
t190C	Temperature 2 ITS-90	degress Celsius
turbWETntu0	Turbidity WET Labs ECO	Nephelometric Turbidity Unit (NTU
latitude	latitude in decimal degrees north.	decimal degrees
longitude	longitude in decimal degrees east.	decimal degrees
datetime	date and time of the cast following ISO0861 format.	unitless

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Instruments

Dataset-specific Instrument Name	Sea-Bird SBE 911plus
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Dataset-specific Description	SeaBird 911+ CTD
Generic Instrument Description	The Sea-Bird SBE 911plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911plus 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 9plus and SBE 11plus is called a SBE 911plus. The SBE 9plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3plus and SBE 4). The SBE 9plus 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

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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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