Cruise event logs from R/V Atlantic Explorer X0606, X0705, AE0810 in the Western Sargasso Sea roughly 38-20N and 66-43W Water from 2006-2008 (ATP3 project)

Website: https://www.bco-dmo.org/dataset/3353
Version: 06 December 2011
Version Date: 2011-12-06

Project
» DOP Utilization in the Sargasso Sea: Quantifying Taxon-specific Rates of Hydrolysis and Uptake (ATP3)

Contributors	Affiliation	Role
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Dataset Description

DOP Utilization (ATP3, DOP) Cruise Event Logs
Biogeochemical data collected on transect cruises studying
Dissolved Organic Phosphorus throughout the western Sargasso Sea.
Data are from several cruises over the span 2006 to 2008.

Note the cruise identifiers for the Atlantic Explorer were originally formatted as XYY## (e.g. X0806 was the 6th cruise in 2008). The data files include cruise IDs of this type. The vessel operator changed the cruise ID syntax several years after the cruise and the official cruise ID syntax was changed to AEYY##. For example, AE0810 should be the same cruise as X0810. One exception for this dataset is that X0804 is cruise ID AE0810.

Methods & Sampling

Prepared by science party aboard the vessel

Data Processing Description

BCO-DMO Edits
- Parameter names modified to conform to BCO-DMO convention
- date reformatted to YYYYMMDD
- time reformatted to HHMM
- lat/lon padded to 7 decimal places
- commas in activities and comments field replaced with semi colons
- added CruiseId column and combined all event logs into one dataset
- X0606 station 7 year corrected from 2007 to 2006
- Lat/Lons for X0606 standardized to positions from BGC data

- "nd" added to blank fields

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Data Files

File
Event_Logs.csv(Comma Separated Values (.csv), 18.33 KB) MD5:cadde18314651134f9739615a7bb8588 Primary data file for dataset ID 3353

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Parameters

Parameter	Description	Units
CruiseId	DOP Cruise Id	text
date	Date of operation (GMT)	YYYYMMDD
time	Time of operation (GMT)	HHMM
Station	Station Id	text
Cast	CTD Drop Number	integer
Operation	Operation Type	text
lon	Station longitude (West is negative)	decimal degrees
lat	Station latitude (South is negative)	decimal degrees
Comments	Comments	text
SIC	Scientist in charge of operation (SIC)	text

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Deployments

X0606

Website	https://www.bco-dmo.org/deployment/58060
Platform	R/V Atlantic Explorer
Start Date	2006-05-19
End Date	2006-05-27
Description	One in a series of transect cruises to study the biological and biogeochemical aspects of the marine phosphorus cycle.

X0705

Website	https://www.bco-dmo.org/deployment/58061
Platform	R/V Atlantic Explorer
Start Date	2007-06-02
End Date	2007-06-14
Description	One in a series of transect cruises to study the biological and biogeochemical aspects of the marine phosphorus cycle.

AE0810

Website	https://www.bco-dmo.org/deployment/58062
Platform	R/V Atlantic Explorer
Start Date	2008-05-03
End Date	2008-05-25
Description	One in a series of transect cruises to study the biological and biogeochemical aspects of the marine phosphorus cycle. Note the cruise identifiers for the Atlantic Explorer were originally formatted as XYY## (e.g. X0806 was the 6th cruise in 2008). The data files include cruise IDs of this type. The vessel operator changed the cruise ID syntax several years after the cruise and the official cruise ID syntax was changed to AEYY##. For example, AE0810 should be the same cruise as X0810. One exception for this dataset is that X0804 is cruise ID AE0810 (unclear how the cruise numbering scheme got so confused). Database validation showed that AE0804 was not the correct cruiseid based on information at R2R. The cruiseid was then updated to reflect the corrected information (the May 2008 cruise was AE0810. Additional Information from R2R Site

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Project Information

DOP Utilization in the Sargasso Sea: Quantifying Taxon-specific Rates of Hydrolysis and Uptake (ATP3)

Website: http://www.bios.edu/Labs/pel/Research%20Pages/Research_DOP.html

Coverage: Western Sargasso Sea roughly 38-20oN and 66-43oW.
Water depths always exceeded 4200m.

Photosynthetic uptake of CO2 by oceanic phytoplankton and the export of the resulting organic carbon to the deep sea comprise a 'biological pump' capable of extracting globally significant amounts of CO2 from the atmosphere. Mounting evidence suggests that primary production in two of the larger subtropical ocean gyres, the Western Tropical/Subtropical Atlantic and the North Pacific Subtropical Gyre (NPSG), may be

controlled by the availability of inorganic phosphorus. This conclusion is based on vanishingly low inorganic phosphorus (SRP) concentrations, sub-nanomolar in some locales, ratios of inorganic nutrient availability that greatly exceed the canonical Redfield Ratio, and high rates of dissolved organic phosphorus (DOP) hydrolysis.

Indeed, data collected in the Sargasso Sea shows a 30% decline in DOP inventories during summer stratification. Moreover, several studies have documented significant taxonomic variability in the ability to hydrolyze and to assimilate phosphorus from organic sources We hypothesize that despite rapid turnover times, chronically low and seasonally invariant SRP concentrations at BATS cannot support measured rates of primary production without utilization of additional P from the DOP pool. Moreover, we hypothesize that inherent physiological differences among microbial taxa represents a significant source of temporal and spatial variability in DOP utilization rates that is yet neither understood nor constrained.

Our specific research objectives are:
1. To quantify temporal and spatial variability in DOP hydrolysis in the Sargasso Sea with measures of whole-community and taxon-specific alkaline phosphatase
2. To quantify temporal and spatial variability in taxon-specific SRP and DOP uptake rates by combining flow cytometry and radioisotope methodologies.
3. To quantify whole-community total P uptake rates through BAP (biologically available phosphorus) assays, as well as SRP and model compound DOP uptake and regeneration rates.
4. To identify factors regulating rates of DOP hydrolysis and assimilation using experimental nutrient manipulations, and to evaluate the role of DOP in supporting primary production in the Sargasso Sea.

To successfully meet our objectives, we propose to employ three cruise sampling strategies: CORE, PROCESS, and CRUISES OF OPPORTUNITY. The CORE cruises and CRUISES OF OPPORTUNITY will be conducted in conjunction with the BATS biogeochemical time-series program. The PROCESS cruises are principal-use cruises that are designed to allow a more intensive study on the mechanisms of and controls on DOP hydrolysis and utilization in the Sargasso Sea.

An understanding of ocean ecosystem function is important on a broad scale. This project will provide information critical for successful modeling efforts constrain predictions of the strength of the oceanic biological pump, as well as provide information of interest to students, teachers and the general public. If in fact DOP supports a significant, and previously unquantified, fraction of the annual primary production in the Sargasso Sea, then diversity in biological metabolic processes in the central oceans plays a greater role in the global carbon cycle - including regulation of atmospheric CO2 - than we recognize at present. The overall goal of the student teaching/training programs at BBSR, WHOI and Rutgers is to expose students to oceanographic research, its global significance, and its impact on their daily lives. As such, we will incorporate data on DOP cycling in the Sargasso Sea into a problem-based learning module for courses taught by the PIs and submit our curriculum to the appropriate digital repository (e.g. www.dlese.org). The PIs have a strong commitment to direct mentoring, and they will also sponsor a minimum of three undergraduate researchers each year in their laboratories, and support the research and training of MIT/WHOI Joint Program and Rutgers University graduate students.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0453023

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