Cruise track position data from ship underway sampling system from R/V Hugh R. Sharp cruise HRS100808BW in 2010 (Marine Nitrogen Cycling by Stable Isotope Probing project)

Website: https://www.bco-dmo.org/dataset/3506
Version: 19 December 2013
Version Date: 2013-12-19

Project
» Determining rates of group-specific phytoplankton and bacterial uptake of inorganic and organic nitrogen by means of stable isotope techniques (Marine Nitrogen Cycling by Stable Isotope Probing)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Dataset Description

Cruise track data set was created from the daily SMS CSV text files included in the original cruise data distribution contributed to BCO-DMO by the Chief Scientist.

Longitude values corrected for West longitude - 19December2013/srg

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Data Files

File
cruise_track.csv (Comma Separated Values (.csv), 3.43 MB) MD5:ec2935532026d45bd8644140460d58a9 Primary data file for dataset ID 3506

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Parameters

Parameter	Description	Units
cruise_ID	Cruise Id	text
date_uway	Date	M/DD/YYYY
time_uway	Time	HH:MM:SS
latitude	Latitude (South is negative)	decimal degrees
longitude	Longitude (West is negative)	decimal degrees

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Instruments

Dataset-specific Instrument Name	Global Positioning System Receiver
Generic Instrument Name	Global Positioning System Receiver
Generic Instrument Description	The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. The U.S. Air Force develops, maintains, and operates the space and control segments of the NAVSTAR GPS transmitter system. Ships use a variety of receivers (e.g. Trimble and Ashtech) to interpret the GPS signal and determine accurate latitude and longitude.

Dataset-specific Instrument Name	SMS
Generic Instrument Name	Shipboard Surface Mapping System
Dataset-specific Description	Surface Mapping System (SMS): The SMS records navigation, meteorological and sea surface data every 10 seconds.
Generic Instrument Description	Surface Mapping System (SMS): The SMS records navigation, meteorological and sea surface data every 10 seconds.

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Deployments

HRS100808BW

Website	https://www.bco-dmo.org/deployment/58715
Platform	R/V Hugh R. Sharp
Start Date	2010-08-10
End Date	2010-08-16
Description	August 2010 Marine Nitrogen Cycling by Stable Isotope Probing cruise in Chespeake Bay, funded by: NSF OCE-0241310 Original cruise data are available from the NSF R2R data catalog

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Project Information

Determining rates of group-specific phytoplankton and bacterial uptake of inorganic and organic nitrogen by means of stable isotope techniques (Marine Nitrogen Cycling by Stable Isotope Probing)

Coverage: Chesapeake Bay

From the NSF award abstract: The marine nitrogen (N) cycle involves a complex network of biological transformations among different inorganic and organic N reservoirs. Considerable progress has been made in defining N cycling processes in marine environments in recent years, but significant questions remain unanswered in part due to methodological limitations. Traditional tools for studying N cycling, for example, cannot accurately assess phytoplankton or bacteria specific N use in marine ecosystems. Therefore there is a need to develop new techniques and methodologies. The PIs of this project have recently made two important advances in this context: (1) a flowcytometric methodology (FCM) to separate phytoplankton from bacteria was applied to separately measure N uptake by these two groups. Prior methodologies relied on measurements of different size fractions, which always contain some degree of both phytoplankton and bacterial uptake. FCM allows for the distinct separation of bacterial versus phytoplankton N incorporation. (2) N-based DNA stable isotope probing (SIP) methodology has been adapted to interrogate N uptake in specific phytoplankton populations. DNA SIP can provide evidence for the uptake of an N source into a specific population of phytoplankton or bacteria. This methodology is in contrast to traditional measurements, which cannot make inferences about individual populations or species.

This project aims to apply these two methodological advances in order to obtain the next generation of N uptake measurements. Phytoplankton and bacteria specific uptake rates will be measured via the FCM technique, and the individual groups or species of phytoplankton or bacteria will be interrogated for N uptake via DNA SIP. These tools will be applied across the well-characterized nutrient gradient found in Chesapeake Bay during one summer cruise and one winter cruise. Phytoplankton, bacterial, and archaeal populations will be characterized along the sampling transect via multiplexed pyrosequencing technology. N uptake will be measured for inorganic (NH4+, NO3-, and NO2-) and organic N sources (15N and 14C urea dual-labeled and amino acids) as substrates. The investigators hypothesize that phytoplankton will derive a larger percentage of their N nutrition from organic forms along the transect (i.e. North to South), as competition with bacteria for ammonium increases. DNA SIP will be applied to specific dominant phytoplankton and bacterial populations in order to investigate their N nutrition. By applying this unique combination of methodologies, the project will provide unprecedented community, group and species level resolution of N uptake in Chesapeake Bay and will furnish us with an improved understanding of N cycling in the Bay and marine systems as a whole.

Related Publication: Wawrik, B; Callaghan, AV; Bronk, DA. "Use of Inorganic and Organic Nitrogen by Synechococcus spp. and Diatoms on the West Florida Shelf as Measured Using Stable Isotope Probing," *APPLIED AND ENVIRONMENTAL MICROBIOLOGY*, v.75, 2009, p. 6662-6670. View record at Web of Science

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Program Information

Ocean Carbon and Biogeochemistry (OCB)

Website: http://us-ocb.org/

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO2 and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0960806
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961900

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