Dissolved inorganic nutrient concentrations from ctd cast deployments and underway seawater inflow from Endeavor 532 and Endeavor 538

Website: https://www.bco-dmo.org/dataset/651816
Version:
Version Date: 2016-07-14

Project
» Functional diversity of marine eukaryotic phytoplankton and their contributions to the C and N cycling (DimBio NABE)

Program
» Dimensions of Biodiversity (Dimensions of Biodiversity)

Contributors	Affiliation	Role
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Dataset Description

Dissolved inorganic nutrient concentrations from CTD casts made during the August-September 2013 EN532 and April-May 2014 EN358 cruises aboard R/V Endeavor. Study sites in the subarctic Atlantic Ocean along the 20 °W meridian between 50 °N and 60 °N in September 2013 and May 2014. Two transects from the US East coast to the subarctic study sites were performed as well.

Related Dataset:
EN532 - CTD
EN538 - CTD
Chlorophyll-a: EN532 and EN538
FCM: EN532 and EN538
Particulate N and NO3 isotopes: EN532

Methods & Sampling

Seawater for nutrient assays was collected from the Niskin bottles attached to the CTD/Rosette system into acid cleaned (10% HCl), ‘aged’, 60 ml HDPE (Nalgene) sample bottles. In most cases, samples were analysed immediately for nutrients, and always within 2-3 hours of collection. Nanomolar ammonium was analysed using the method by Holmes (1999) following its reaction with a fluorescent reagent. Nitrate, nitrite were detected using a NOx analyzer from Teledyne Instruments, based on the chemiluminescence reaction of nitric oxide and ozone using Vanadium (III) reduction (Braman and Hendrix 1989). Silicate concentrations were measured on 0.8 µm filtered samples according to Strickland and Parsons (1968), by Daniel Qian and Nicolas Van Oostende at Princeton University. The detection limits were estimated to be 20 nM for NH4, 10 nM for NO2, 50 nM for NO3+NO2 and 100 nM for Si(OH)4.

Clean handling techniques were employed to avoid any contamination of the samples, particularly for the ammonium samples. Dura-Touch gloves were used at all times and samples were not decanted or transferred, but were kept tightly closed until just before ammonium analysis in order to avoid any contamination from external sources. No water column nutrient samples were frozen or stored except for silicate. All sampling and handling techniques, whenever possible, followed the international nutrient GO-SHIP manual (Hydes et al. 2010).

Data Processing Description

Nutrient measurements made by Andrew and Aimée Babbin onboard the ship and only the “low range” data are reported in case of nitrate. When measurements were below the limit of the quantification, the limit of quantification for that particular measurement is given and accompanied with a quality flag ("6"). 'nd' indicates no measurements were made with a quality flag (“9”).

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- replaced blank cells with nd
- added depth_w to EN538 datasets so they'd match EN532

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Data Files

File
nuts.csv (Comma Separated Values (.csv), 44.86 KB) MD5:55d95187170df3c4a207138ce1c8be8a Primary data file for dataset ID 651816

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Related Datasets

IsRelatedTo

Ward, B. B., Allen, A. E., Sigman, D. M. (2022) **Chlorophyll-a concentrations from CTD cast deployments and underway seawater inflow from Endeavor 532 and Endeavor 538 cruises in 2013 and 2014.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2) Version Date 2017-07-17 doi:10.26008/1912/bco-dmo.651784.2 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
cruise_id	cruise identification	unitless
cast	cast number	unitless
ISO_DateTime_UTC	UTC day and decimal time; as 326.5 for the 326th day of the year or November 22 at 1200 hours (noon).	yrday_utc
lon	longitude; east is positive	decimal degrees
lat	latitude; north is positive	decimal degrees
depth_w	depth of the water	meters
depth	depth	meters
NH4	ammonium NH4+ concentration	nanoMolar
NH4_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless
NO3_NO2	nitrate and nitrite NO3-+NO2- concentration	nanoMolar
NO3_NO2_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless
NO3	nitrate NO3- concentration	nanoMolar
NO3_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless
NO2	nitrite NO2- concentration	nanoMolar
NO2_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless
SiOH_4	orthosilicic acid Si(OH)4 concentration	nanoMolar
SiOH_4_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless

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Instruments

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

Dataset-specific Instrument Name	
Generic Instrument Name	Fluorometer
Dataset-specific Description	Turner Trilogy fluorometer
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	
Generic Instrument Name	High-Performance Liquid Chromatograph
Generic Instrument Description	A High-performance liquid chromatograph (HPLC) is a type of liquid chromatography used to separate compounds that are dissolved in solution. HPLC instruments consist of a reservoir of the mobile phase, a pump, an injector, a separation column, and a detector. Compounds are separated by high pressure pumping of the sample mixture onto a column packed with microspheres coated with the stationary phase. The different components in the mixture pass through the column at different rates due to differences in their partitioning behavior between the mobile liquid phase and the stationary phase.

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.

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Deployments

EN532

Website	https://www.bco-dmo.org/deployment/563687
Platform	R/V Endeavor
Report	http://dmoserv3.bco-dmo.org/data_docs/DimBio_NABE/EN532_CruiseReport.pdf
Start Date	2013-08-22
End Date	2013-09-15
Description	Study sites in the subtropical North-Atlantic Ocean near the Bermuda Atlantic Time Series in February 2012 and August 2012, and in the subarctic Atlantic Ocean along the 20W meridian between 50N and 60N in September 2013 and May 2014. Two transects from the US East coast to the subarctic study sites were performed as well.

EN538

Website	https://www.bco-dmo.org/deployment/563697
Platform	R/V Endeavor
Report	http://dmoserv3.bco-dmo.org/data_docs/DimBio_NABE/EN538_CruiseReport.pdf
Start Date	2014-04-29
End Date	2014-05-22
Description	Study sites in the subarctic Atlantic Ocean along the 20 °W meridian between 58 °N and 60 °N in May 2014. A transect from the US East coast (RI) to the subarctic study sites was performed as well.

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Project Information

Functional diversity of marine eukaryotic phytoplankton and their contributions to the C and N cycling (DimBio NABE)

Coverage: North Atlantic Ocean, transects from southwest to northeast

This project will investigate the taxonomic, genetic and functional diversity of eukaryotic phytoplankton at two North Atlantic sites (subarctic and subtropical) in two seasons. The PIs will use diagnostic microarrays for community analysis based on functional genes (both DNA and RNA) and next generation sequencing (i.e., transcriptomics using 454 technology) to identify the players, both in terms of community composition and activity, and to explore the functional diversity of the natural assemblage. In order to identify which groups are active in C and N assimilation and which N source is being utilized by the different size and functional groups, both filter-separated and flow cytometry-sorted samples will be used to 1) measure 13C primary production and 15N assimilation by incubations with isotope tracers, 2) measure the natural stable N isotope signatures of different taxonomic groups and 3) link the molecular diversity to the functional diversity in C and N transformations. Using flow cytometry linked to mass spectrometry, these investigators have found an unexpectedly strong differentiation in the form of N assimilated by prokaryotes and eukaryotes, with eukaryotes being more dynamic.

This project will investigate the taxonomic, genetic and functional diversity of eukaryotic phytoplankton and to link this diversity and assemblage composition to the carbon and nitrogen biogeochemistry of the surface ocean. Taxonomic diversity will be investigated by identifying the components of the phytoplankton assemblages using molecular, chemical and microscope methods. Genetic diversity will be explored at several levels, including direct sequencing of clone libraries of key functional genes and metatranscriptomic sequencing and microarray analysis of size fractionated/sorted phytoplankton assemblages. Using natural abundance and tracer stable isotope methods, genetic and taxonomic diversity will be linked to functional diversity in C and N assimilation in size- fractionated and taxon-sorted populations.

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Program Information

Dimensions of Biodiversity (Dimensions of Biodiversity)

Website: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503446

Coverage: global

(adapted from the NSF Synopsis of Program)
Dimensions of Biodiversity is a program solicitation from the NSF Directorate for Biological Sciences. FY 2010 was year one of the program. [MORE from NSF]

The NSF Dimensions of Biodiversity program seeks to characterize biodiversity on Earth by using integrative, innovative approaches to fill rapidly the most substantial gaps in our understanding. The program will take a broad view of biodiversity, and in its initial phase will focus on the integration of genetic, taxonomic, and functional dimensions of biodiversity. Project investigators are encouraged to integrate these three dimensions to understand the interactions and feedbacks among them. While this focus complements several core NSF programs, it differs by requiring that multiple dimensions of biodiversity be addressed simultaneously, to understand the roles of biodiversity in critical ecological and evolutionary processes.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1136345

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