Chlorophyll-a concentrations from CTD cast deployments and underway seawater inflow from Endeavor 532 and Endeavor 538 cruises in 2013 and 2014

Website: https://www.bco-dmo.org/dataset/651784
Data Type: Cruise Results
Version: 2
Version Date: 2017-07-17

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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Abstract
Chlorophyll-a concentrations from CTD cast deployments and underway seawater inflow from Endeavor 532 and Endeavor 538 cruises in 2013 (August and September) and 2014 (April and May).

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Coverage

Spatial Extent: **N**:59.83 **E**:340.096 **S**:35.547 **W**:286.735
Temporal Extent: 2013-08-23 - 2014-05-17

Dataset Description

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

Acquisition Description

Discrete chlorophyll *a* (Chla) samples were measured fluorometrically (Holm-Hansen & Riemann 1978) by Nicolas Van Oostende and Jessica Lueders Dumont at 6 depths spanning the surface, the bottom of the euphotic zone, the mixed layer, and Chla maximum depths. Up to 4 liters of seawater, retrieved directly from the Niskin bottles or the surface seawater inflow, were sequentially filtered through a 20 µm pore-size polycarbonate filter, a 2 µm pore-size polycarbonate filter, and a 0.3 µm pore-size glass fiber filter (GF-75; Sterlitech; 47 mm diameter). Filtrations were performed in the dark under low vacuum (<200 mbar). The Chla filters were packaged into aluminium foil (GF filter), or a 5 ml cryovial, and immediately frozen at -80°C until analysis.

Chlorophyll was extracted in 90% acetone at 4°C overnight and measured using a Turner Trilogy fluorometer, calibrated against a pure Chla standard (*Anacystis nidulans* Chla, Sigma-Aldrich, Saint-Louis, USA). Measurements were corrected for the fluorescence of phaeopigments after acidification with HCl (24 mM final concentration). Limit of quantification was 1 µg per liter in extract, or approximately 1 ng per liter in the sample. The Chlorophyll *a* concentration of casts 15 to 41 was measured by James L. Pinckney using the HPLC method derived from the Van Heukelem et al. (1992, 1994) and Pinckney et al. (1996) protocols.

Processing Description

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

- replaced original 2016-07-13 EN532 data with new version submitted 2017-07-14. Cast numbers were rearranged.

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Related Publications

Heukelem, L., Lewitus, A. J., Kana, T. M., & Craft, N. E. (1992). HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY OF PHYTOPLANKTON PIGMENTS USING A POLYMERIC REVERSED-PHASE C18 COLUMN1. Journal of Phycology, 28(6), 867–872. https://doi.org/10.1111/j.0022-3646.1992.00867.x
Methods

Holm-Hansen, O., & Riemann, B. (1978). Chlorophyll a Determination: Improvements in Methodology. Oikos, 30(3), 438. doi:10.2307/3543338
Methods

Pinckney, J. L., Millie, D. F., Howe, K. E., Paerl, H. W., & Hurley, J. P. (1996). Flow scintillation counting of 14C-labeled microalgal photosynthetic pigments. Journal of Plankton Research, 18(10), 1867–1880. doi:10.1093/plankt/18.10.1867
Methods

Van Heukelem, L., Lewitus, A., Kana, T., & Craft, N. (1994). Improved separations of phytoplankton pigments using temperature-controlled high performance liquid chromatography. Marine Ecology Progress Series,

114(3), 303-313. Retrieved from http://www.jstor.org/stable/24849703
Methods

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Related Datasets

IsRelatedTo

Ward, B. B., Allen, A. E., Sigman, D. M. (2015) **CTD data from the R/V Endeavor (EN532) cruise in the subarctic Atlantic Ocean during 2013 (DimBio NABE project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2015-07-31) Version Date 2015-07-31 http://lod.bco-dmo.org/id/dataset/563684 [view at BCO-DMO]

Ward, B. B., Allen, A. E., Sigman, D. M. (2015) **CTD data from the R/V Endeavor (EN538) cruise in the subarctic Atlantic Ocean during 2014 (DimBio NABE project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2015-07-31) Version Date 2015-07-31 http://lod.bco-dmo.org/id/dataset/564097 [view at BCO-DMO]

Ward, B. B., Allen, A. E., Sigman, D. M. (2016) **Dissolved inorganic nutrient concentrations from ctd cast deployments and underway seawater inflow from Endeavor 532 and Endeavor 538.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). Version Date 2016-07-14 http://lod.bco-dmo.org/id/dataset/651816 [view at BCO-DMO]

Ward, B. B., Allen, A. E., Sigman, D. M. (2016) **Particulate nitrogen concentrations, N isotopic composition, and nitrate isotopic composition from EN532.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2) Version Date 2016-07-15 http://lod.bco-dmo.org/id/dataset/652025 [view at BCO-DMO]

Ward, B. B., Allen, A. E., Sigman, D. M. (2016) **Pico- and Nanoplankton concentrations from CTD cast deployments collected from the R/V Endeavor (EN532, EN538) cruises in the subarctic Atlantic Ocean from 2013-2014 (DimBio NABE project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). Version Date 2016-07-15 http://lod.bco-dmo.org/id/dataset/651890 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
cruise_id	cruise identification	unitless
cast	cast number	unitless
ISO_DateTime_UTC	date and time of sampling in ISO8601 format (UTC)	unitless
lon	longitude; east is positive	decimal degrees
lat	latitude; north is positive	decimal degrees
depth_w	depth of the water	meters
depth	depth	meters
Chla_2_20um	chlorophyll a concentration in the larger than 2 µm and smaller than 20 µm size fraction	nanogram/liter
Chla_2_20um_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless
Chla_gt_20um	chlorophyll a concentration in the larger than 20 µm size fraction	nanogram/liter
Chla_gt_20um_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless
Chla_lt_2um	chlorophyll a concentration in the smaller than 2 µm size fraction	nanogram/liter
Chla_lt_2um_flag	quality flag: 1=ok; 6=below detection limit; 9=no measurement	unitless
Chla_total	sum of size-fractionated chlorophyll a concentration or total not size-fractionated chlorophyll a concentration	nanogram/liter
Chla_total_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	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.

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	CTD Sea-Bird SBE 911plus
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

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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