

BATS phytoplankton and cyanobacteria DGGE DNA data from R/V Atlantic Explorer, R/V Oceanus cruises in the Bermuda Atlantic Time Series Station (BATS) from 2008-2010 (Plankton particle flux project)

Website: <https://www.bco-dmo.org/dataset/3818>

Version: 2013-04-15

Project

» [Composition of the plankton community and its contribution to particle flux in the Sargasso Sea](#) (Plankton particle flux)

Program

» [Ocean Carbon and Biogeochemistry](#) (OCB)

Contributors	Affiliation	Role
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Dataset Description

This dataset includes eukaryotic and cyanobacterial DNA sequence data obtained from the upper water column as well as from shallow drifting traps during regular BATS cruises from May 2008-April 2010. Specifically, it contains a complete list of denaturing gradient gel results and the closest sequence matches from the NCBI database for each excised band (phylogroup) as well as original denaturing gradient gel images.

Methods & Sampling

Sampling and Analytical Methodology:

Sampling was conducted monthly from May 2008-April 2010 at the Bermuda Atlantic Time-Series (BATS). Samples were collected for DNA analysis from four depths in the upper water column and from 150 m particle traps. DNA was extracted from these samples and a region of the 18S ribosomal RNA gene for eukaryotes and 16S rRNA gene for cyanobacteria was amplified by PCR using eukaryotic and cyanobacterial primers. Each amplified sample was subjected to Denaturing Gradient Gel Electrophoresis in order to “fingerprint” the community. Individual bands were excised and identified by sequence matching using the NCBI database (<http://blast.ncbi.nlm.nih.gov>). Quantity One software package was used to determine similarity between samples. The efficiency of recovery was determined by qPCR in order to accurately calculate the DNA present in the water column and DNA flux into particle traps. For further detail please refer to:

Jessica Amacher, Susanne Neuer, Michael Lomas. 2013. DNA-based molecular fingerprinting of eukaryotic protists and cyanobacteria contributing to sinking particle flux at the Bermuda Atlantic time-series study. Deep Sea Research part II. 93: 71-83.

Data Processing Description

Data Processing:

Denaturing gradient gels were imaged and analyzed with the BioRad Fluor-S imager. Bands were selected and matched manually for band matrices included in these data.

BCO-DMO Note: Cruise 242 was on the RV/Oceanus, not the Atlantic Explorer. The cruise id was corrected 5/13/2013. (NJC)

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Data Files

File
phytoflux_BATS.csv (Comma Separated Values (.csv), 575.38 KB) MD5:abc6217199a54ce325729dbf1481feb0
Primary data file for dataset ID 3818

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Parameters

Parameter	Description	Units
cell_type	eukaryotes or cyanobacteria	text
cruise_id1	official rvdata cruise name	alphanumeric
cruise_id2	original cruise number	alphanumeric
year	year of sampling	YYYY
month	month of sampling	0-12
day	day of sampling	0-31
yrday_gmt	year-day of sampling	1-365
lane	electrophoresis lane	integer
z10	10 meters sample flag; 1=yes; 0=no	0 or 1
z20	20 meters sample flag; 1=yes; 0=no	0 or 1
z25	25 meters sample flag; 1=yes; 0=no	0 or 1
z30	30 meters sample flag; 1=yes; 0=no	0 or 1
z40	40 meters sample flag; 1=yes; 0=no	0 or 1
z60	60 meters sample flag; 1=yes; 0=no	0 or 1
z70	70 meters sample flag; 1=yes; 0=no	0 or 1
z75	75 meters sample flag; 1=yes; 0=no	0 or 1
z80	80 meters sample flag; 1=yes; 0=no	0 or 1
z85	85 meters sample flag; 1=yes; 0=no	0 or 1
z90	90 meters sample flag; 1=yes; 0=no	0 or 1

z100	100 meters sample flag; 1=yes; 0=no	0 or 1
z110	110 meters sample flag; 1=yes; 0=no	0 or 1
z120	120 meters sample flag; 1=yes; 0=no	0 or 1
z130	130 meters sample flag; 1=yes; 0=no	0 or 1
z138	138 meters sample flag; 1=yes; 0=no	0 or 1
z140	140 meters sample flag; 1=yes; 0=no	0 or 1
z150	150 meters sample flag; 1=yes; 0=no	0 or 1
z180	180 meters sample flag; 1=yes; 0=no	0 or 1
fixed_trap_150m	sample flag for 150 meter fixed trap	0 or 1
unfixed_trap_150m	sample flag for 150 meter unfixed trap	0 or 1
unfixed_trap_a_150m	sample flag for 150 meter unfixed trap a	0 or 1
unfixed_trap_b_150m	sample flag for 150 meter unfixed trap b	0 or 1
unfixed_trap_c_150m	sample flag for 150 meter unfixed trap c	0 or 1
unfixed_trap_d_150m	sample flag for 150 meter unfixed trap d	0 or 1
band_num	electrophoresis band number	integer
id_closest_match	species of closest dna match	text
accession_number_1	GenBank accession number of closest match	alphanumeric
identity_pcent_1	percent similarity of sample with closest match	integer
id_closest_cultured_match	species of closest cultured match	text
accession_number_2	GenBank accession number of closest cultured match	alphanumeric
identity_pcent_2	percent similarity of sample with closest cultured match	integer
taxon_1	coarse taxonomic identity	text
taxon_2	finer taxonomic identity	text

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Instruments

Dataset-specific Instrument Name	Sediment Trap
Generic Instrument Name	Sediment Trap
Generic Instrument Description	Sediment traps are specially designed containers deployed in the water column for periods of time to collect particles from the water column falling toward the sea floor. In general a sediment trap has a jar at the bottom to collect the sample and a broad funnel-shaped opening at the top with baffles to keep out very large objects and help prevent the funnel from clogging. This designation is used when the specific type of sediment trap was not specified by the contributing investigator.

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Deployments

AE0811

Website	https://www.bco-dmo.org/deployment/58921
Platform	R/V Atlantic Explorer
Start Date	2008-05-28
End Date	2008-06-01
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0813

Website	https://www.bco-dmo.org/deployment/58922
Platform	R/V Atlantic Explorer
Start Date	2008-06-21
End Date	2008-06-30
Description	Sampling was conducted monthly from May 2008-April 2010 at the Bermuda Atlantic Time-Series (BATS). Samples were collected for DNA analysis from four depths in the upper water column and from 150 m particle traps. Cruise information and original data are available from the NSF R2R data catalog.

AE0816

Website	https://www.bco-dmo.org/deployment/58923
Platform	R/V Atlantic Explorer
Start Date	2008-07-15
End Date	2008-07-21
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0820

Website	https://www.bco-dmo.org/deployment/58924
Platform	R/V Atlantic Explorer
Start Date	2008-08-11
End Date	2008-08-17
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0823

Website	https://www.bco-dmo.org/deployment/58925
Platform	R/V Atlantic Explorer
Start Date	2008-09-09
End Date	2008-09-14
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0826

Website	https://www.bco-dmo.org/deployment/58926
Platform	R/V Atlantic Explorer
Start Date	2008-10-06
End Date	2008-10-12
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0829

Website	https://www.bco-dmo.org/deployment/58927
Platform	R/V Atlantic Explorer
Start Date	2008-11-08
End Date	2008-11-16
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0901

Website	https://www.bco-dmo.org/deployment/58920
Platform	R/V Atlantic Explorer
Start Date	2009-02-07
End Date	2009-02-11
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0902

Website	https://www.bco-dmo.org/deployment/58919
Platform	R/V Atlantic Explorer
Start Date	2009-02-21
End Date	2009-02-23

AE0904

Website	https://www.bco-dmo.org/deployment/58917
Platform	R/V Atlantic Explorer
Start Date	2009-03-16
End Date	2009-03-20
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0907

Website	https://www.bco-dmo.org/deployment/58915
Platform	R/V Atlantic Explorer
Start Date	2009-04-14
End Date	2009-04-17
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0909

Website	https://www.bco-dmo.org/deployment/58914
Platform	R/V Atlantic Explorer
Start Date	2009-05-14
End Date	2009-05-20
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0911

Website	https://www.bco-dmo.org/deployment/58913
Platform	R/V Atlantic Explorer
Start Date	2009-06-09
End Date	2009-06-13
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0916

Website	https://www.bco-dmo.org/deployment/58912
Platform	R/V Atlantic Explorer
Start Date	2009-07-13
End Date	2009-07-19
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0919

Website	https://www.bco-dmo.org/deployment/58911
Platform	R/V Atlantic Explorer
Start Date	2009-08-13
End Date	2009-08-17
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0921

Website	https://www.bco-dmo.org/deployment/58910
Platform	R/V Atlantic Explorer
Start Date	2009-09-09
End Date	2009-09-15
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0924

Website	https://www.bco-dmo.org/deployment/58909
Platform	R/V Atlantic Explorer
Start Date	2009-10-08
End Date	2009-10-12
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0926

Website	https://www.bco-dmo.org/deployment/58908
Platform	R/V Atlantic Explorer
Start Date	2009-11-06
End Date	2009-11-10
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE0928

Website	https://www.bco-dmo.org/deployment/58907
Platform	R/V Atlantic Explorer
Start Date	2009-12-07
End Date	2009-12-11
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE1001

Website	https://www.bco-dmo.org/deployment/58906
Platform	R/V Atlantic Explorer
Start Date	2010-02-02
End Date	2010-02-06
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE1003

Website	https://www.bco-dmo.org/deployment/58905
Platform	R/V Atlantic Explorer
Start Date	2010-02-22
End Date	2010-02-26
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE1005

Website	https://www.bco-dmo.org/deployment/58904
Platform	R/V Atlantic Explorer
Start Date	2010-03-08
End Date	2010-03-10
Description	Cruise information and original data are available from the NSF R2R data catalog.

AE1006

Website	https://www.bco-dmo.org/deployment/58903
Platform	R/V Atlantic Explorer
Start Date	2010-03-23
End Date	2010-03-27

AE1009

Website	https://www.bco-dmo.org/deployment/58901
Platform	R/V Atlantic Explorer
Start Date	2010-04-20
End Date	2010-04-24
Description	Sampling was conducted monthly from May 2008-April 2010 at the Bermuda Atlantic Time-Series (BATS). Samples were collected for DNA analysis from four depths in the upper water column and from 150 m particle traps. Cruise information and original data are available from the NSF R2R data catalog.

OC449-10

Website	https://www.bco-dmo.org/deployment/59029
Platform	R/V Oceanus
Start Date	2008-12-14
End Date	2008-12-18
Description	Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

Composition of the plankton community and its contribution to particle flux in the Sargasso Sea (Plankton particle flux)

Coverage: BATS site: Bermuda Atlantic Time-Series Study: 31° 45'N, 64° 10'W

The overall objective of this proposal is to investigate linkages between the presence of different key groups of phytoplankton in the euphotic zone and their contribution to particle flux at the subtropical North Atlantic time-series station BATS (Bermuda Atlantic Time-series Study) by applying a range of traditional and novel molecular techniques.

The 'biological pump', the photosynthetically mediated transformation of dissolved inorganic carbon into

particulate and dissolved organic carbon in surface ocean waters and its subsequent export to deep water, is a significant driver of the atmospheric carbon uptake by the oceans. But this "biologically pumped" production, inasmuch as it depends on the composition and activity of planktonic organisms, is susceptible to long-term climatic changes in surface ocean properties such as increased temperature and changes in nutrient supply, especially in subtropical gyres. The sub-tropical gyres and the transition zones at their boundaries play an important role in the global carbon cycle because of their vast size and generally high per area export production. As evidenced in recent studies, the biological mechanisms driving regional to basin scale variability in carbon export in these biomes is far from understood, thus limiting our ability to mechanistically explain the biological pump and to predict its possible responses in the face of environmental change. In an effort to improve this situation with an accurate assessment of the contribution of different plankton groups to overall fluxes, the investigators will test the following two specific hypotheses: 1. The long held notion that large cells and those with mineral tests are major contributors to downward particle flux needs to be re-evaluated. We hypothesize that pico and nanoplankton (also those without mineral tests) are generally important contributors to downward particle flux at BATS. Consequently, the diversity of taxonomic groups contributing to particle flux is greater than previously expected. 2. The relative contribution of taxonomic groups to downward particle flux is a function of physical forcing. We hypothesize that episodic events (e.g., winter storms and eddies) lead to a reduction in diversity of sedimenting phytoplankton (e.g., dominance by a single group such as diatoms) compared to periods marked by more stable conditions in the water column. The broader impacts include furthering knowledge of the diversity and biology of phytoplankton groups that have a significant impact on the carbon export in subtropical gyres, thereby advancing our understanding of regional to basin scale variability in the biogeochemistry of these biomes. The project provides new opportunities for undergraduate and graduate education, as well as offer research opportunities to local high school students and teachers as part of the "Ask-a-Biologist" initiative. The project also includes an international component through collaboration with a molecular ecology group in Barcelona, Spain.

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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-0752592

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