Chlorophyll derived from HPLC from R/V Atlantic Explorer and R/V Cape Hatteras multiple cruises in the Sargasso Sea, Bermuda Atlantic Time Series (BATS) area, and Hydrostation "S" from 2007 to 2008 (ON DEQUE project)

Website: https://www.bco-dmo.org/dataset/3532
Version: 09 September 2011
Version Date: 2011-09-09

Project
» Optical and Nutrient Dependence of Quantum Efficiency (ON DEQUE)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Dataset Description

Chlorophyll a concentration by method of fluorescence of methanol extracted material

Methods & Sampling

Fluorometric chlorophyll and HPLC phytoplankton pigments - Fluorometric chlorophyll samples were collected on both pre-dawn and midday casts in seasoned, well-rinsed 500 ml amber Nalgene bottles and gently vacuum filtered (<5 mm Hg) onto 25 mm diameter Whatman GF/F filters (nominal pore size ~0.7 µm) for “total” chlorophyll. Samples were extracted into 7 ml 100% methanol [*Jeffrey et al.*, 1997] for 24 h in the dark at -20°C and read on a Turner 700 fluorometer equipped with narrow band excitation and emission filters [*Welschmeyer*, 1994] and calibrated with a commercial chlorophyll standard (Sigma) and checked against a solid standard daily.

Phytoplankton HPLC pigment samples were collected on both pre-dawn and midday casts in seasoned, well-rinsed 2L amber Nalgene bottles and gently vacuum filtered (<5 mm Hg) onto 25 mm diameter Whatman GF/F filters (nominal pore size ~0.7 µm). Samples were immediately frozen in liquid N and stored in liquid N until analyzed by the Horn Point Analytical Laboratory (Univ. of MD) according to established methods for high pressure liquid chromatography (HPLC) for phytoplankton pigments [*Hooker et al., 2005*]

Data Processing Description

BCO-DMO Processing Notes
Generated from original .xlsx file "ON DEQUE HPLC DATA.xlsx" contributed by Robert Vallancourt

BCO-DMO Edits
- Column inserted for Date_UTC to go along with Time_UTC
- "nd" (no data) value inserted in blank cells
- Parameter names modified to conform to BCO-DMO convention

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Data Files

File
Chloro_HPLC.csv (Comma Separated Values (.csv), 115.70 KB) MD5:9bc8da23b9abfada999f58ee5c1ba270 Primary data file for dataset ID 3532

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Parameters

Parameter	Description	Units
ProjectId	ID Info; Project	text
CruiseId	ID Info; Cruise Name	text
StationId	ID Info; On Deque station ID	integer
CastId	ID Info; CAST ID	text
Location_Description	ID Info; Location Description	text
Year	ID Info; Year	YYYY
Month	ID Info; Gregorian Month	text
Day_of_Month	ID Info; Day of Gregorian Month	DD
Day_of_Year	ID Info; Sequential Day of Year (whole days 1 = 1 Jan)	DDD
Date_UTC	ID Info; UTC Date	YYYYMMDD

Time_UTC	ID Info; UTC Time	HHMM
Date_Local	ID Info; Local Date	YYYYMMDD
Time_Local	ID Info; Local Time	HHMM
Lon	ID Info; Longitude (deg E)	decimal degrees
Lat	ID Info; Latitude (deg N)	decimal degrees
Depth	ID Info; Depth (meters)	meters
TChl_a	HPLC; [TChl a] (mg/m^3)	mg/m^3
Tchl_b	HPLC; [TChl b](mg/m^3)	mg/m^3
TChl_c	HPLC; [TChl c] (mg/m^3)	mg/m^3
Caro	HPLC; [Caro] (mg/m^3)	mg/m^3
But_fuco	HPLC; [But fuco] (mg/m^3)	mg/m^3
Hex_fuco	HPLC; [Hex fuco] (mg/m^3)	mg/m^3
Allo	HPLC; [Allo] (mg/m^3)	mg/m^3
Diad	HPLC; [Diad] (mg/m^3)	mg/m^3
Diato	HPLC; [Diato] (mg/m^3)	mg/m^3
Fuco	HPLC; [Fuco] (mg/m^3)	mg/m^3
Perid	HPLC; [Perid] (mg/m^3)	mg/m^3
Zea	HPLC; [Zea] (mg/m^3)	mg/m^3
Chl_a	HPLC; [Chl a] (mg/m^3)	mg/m^3

DVChl_a	HPLC; [DVChl a] (mg/m^3)	mg/m^3
Chlide_a	HPLC; [Chlide a] (mg/m^3)	mg/m^3
Chl_b	HPLC; [Chl b] (mg/m^3)	mg/m^3
DVChl_b	HPLC; [DVChl b] (mg/m^3)	mg/m^3
Chl_c1	HPLC; Chl c1 (mg/m^3)	mg/m^3
Chl_c2	HPLC; Chl c2 (mg/m^3)	mg/m^3
Chl_c12	HPLC; [Chl c12] (mg/m^3)	mg/m^3
Chl_c3	HPLC; [Chl c3] (mg/m^3)	mg/m^3
Lut	HPLC; [Lut] (mg/m^3)	mg/m^3
Neo	HPLC; [Neo] (mg/m^3)	mg/m^3
Viola	HPLC; [Viola] (mg/m^3)	mg/m^3
Phytin_a	HPLC; [Phytin a] (mg/m^3)	mg/m^3
Phide_a	HPLC; [Phide a] (mg/m^3)	mg/m^3
Pras	HPLC; [Pras] (mg/m^3)	mg/m^3
Gyr_diester	HPLC; [Gyr diester] (mg/m^3)	mg/m^3
TChl	HPLC; [TChl] (mg/m^3)	mg/m^3
PPC	HPLC; [PPC] (mg/m^3)	mg/m^3
PSC	HPLC; [PSC] (mg/m^3)	mg/m^3
PSP	HPLC; [PSP] (mg/m^3)	mg/m^3

TCaro	HPLC; [TCaro] (mg/m^3)	mg/m^3
TAcc	HPLC; [TAcc] (mg/m^3)	mg/m^3
TPig	HPLC; [TPig] (mg/m^3)	mg/m^3
DP	HPLC; [DP] (mg/m^3)	mg/m^3

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Instruments

Dataset-specific Instrument Name	CTD profiler
Generic Instrument Name	CTD - profiler
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934.

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Deployments

GF222_BATS

Website	https://www.bco-dmo.org/deployment/58135
Platform	R/V Atlantic Explorer
Start Date	2007-04-14
End Date	2007-04-20

GF226_BATS

Website	https://www.bco-dmo.org/deployment/58136
Platform	R/V Atlantic Explorer
Start Date	2007-08-11
End Date	2007-08-19

CH-05-08

Website	https://www.bco-dmo.org/deployment/58137
Platform	R/V Cape Hatteras
Start Date	2008-07-05
End Date	2008-07-22

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Project Information

Optical and Nutrient Dependence of Quantum Efficiency (ON DEQUE)

Coverage: Western North Atlantic Ocean. Sargasso Sea, Gulf stream, slope waters, shelfbreak front, continental shelf, mid-Atlantic bight

The control of photosynthetic quantum yield of phytoplankton by light intensity and diapycnal nutrient flux

Primary production in the ocean is probably the least known part of the ocean's carbon cycle. One reason that primary production is little known is the lack of understanding of the geographical and temporal variability in phytoplankton physiology. For example it is only recently that the importance has been revealed, of the so-called photoprotectant pigments, pigments that, in effect, shield the photosynthetic apparatus from too much sunlight. This project will investigate the geographic and temporal variability of a fundamental property of oceanic photosynthesis: the quantum yield, or the ratio of the available light to the amount of carbon fixed in photosynthesis. The PIs propose an hypothesis based on earlier measurements, that in the lower parts of the euphotic zone in the stratified ocean, the upward flux of nutrients regulates the value of the quantum yield, while in the upper parts, irradiance governs its value, through the pigment composition of the phytoplankton. This hypothesis will be tested by making estimates of the quantum yield's maximum value through very careful and comprehensive measurements of the bio-optical properties and species composition of the phytoplankton, as well as the submarine light environment, hydrography, and nutrients. These measurements will be along both temporal and spatial gradients in the ocean to create the basis for environmental regulation of quantum yield. These measurements will be used to establish precisely how the maximum value of the quantum yield is regulated by solar flux and plant nutrients. This research provides a mechanism to understand how the processes of nutrient supply and light affect the physiology of natural populations of phytoplankton, a long-standing problem in biological oceanography. It also provides a means for improving the modeling primary productivity, including estimating productivity in the global ocean from space.

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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

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-0550725

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