Sample HPLC pigments from RVIB Nathaniel B. Palmer NBP1302 cruise in the Ross Sea during 2013 (TRACERS project)

Website: https://www.bco-dmo.org/dataset/558908
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Project
» TRacing the fate of Algal Carbon Export in the Ross Sea (TRACERS)

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Dataset Description

HPLC pigment analyses of CTD collected samples from the NBP1302 cruise (Ross Sea, Antarctica).

Methods & Sampling

Water samples were collected from CTD Niskin bottles. Water samples for HPLC analyses were taken from one Niskin bottle per cast-depth combination included in the dataset. Note that the niskin_sampled column indicates which Niskin bottle the HPLC sample was taken from. The niskins_fired column indicates all Niskin bottle numbers fired at the specified depth, though the HPLC sample was taken from only one of those bottles.

Chlorophyll and accessory pigment composition was analyzed by high performance liquid chromatography (HPLC; Agilent 1100). Culture aliquots were filtered on Whatmann GF/F filters, flash frozen in liquid nitrogen, and stored at -80°C until analysis. Just prior to analysis, pigments were extracted overnight in acetone at -20°C. The following day extracted pigments were centrifuged and measured using a gradient elution method (DiTullio and Geesey, 2003), a modification of the Zapata et al 2000 method. Chromatographic separation was performed using a Waters C8 symmetry column, photodiode array and fluorescence detectors. The internal standard, β-Apo-8-carotenal-trans standard (Fluka Chemical Corp., USA) was added to extracted pigments as a peak reference. Individual pigment peaks were quantified with Chemstation software (revision B.03.01, Agilent) and our pigment action spectra library calibrated using pigment standards from DHI LABS (Hoersholm, Denmark) and in-house purifications of non-commercially available pigments. Coefficient of variation among replicate HPLC injections is < 3% and our limit of detection is approximately 1 ng L-1.

Nathaniel B. Palmer Systems and Specifications

Data Processing Description

Response factors for pigments were performed using dilutions of calibration standards. Full details of data processing and methods used can be found in:
DiTullio, G. R. & Geesey, M. E. (2002) Photosynthetic pigments in marine algae and bacteria. In: BITTON, G. (ed.) The Encyclopedia of Environmental Microbiology. New York: John Wiley & Sons Inc.

BCO-DMO Processing Notes:
- Generated from original .xlsx file "NPB1302 BCO-DMO.xls, sheet: CTD Final" contributed by Emily Cooper
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name
- Blanks (missing data) replaced with "nd" meaning "no data";
- Date reformmated to YYYYMMDD
- Time reformatted to HHMM
- Added ISO_DateTime_UTC column from original DATE and TIME fields
- Lat/Lon whole degs and minutes removed (decimal degrees preserved)
- Original Lat/Lon position for CTD-135 corrected using cruise track navigation

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Data Files

File
HPLC_Pigments_CTD.csv (Comma Separated Values (.csv), 58.11 KB) MD5:3a4655809a94db950d5b1225d7a2f574 Primary data file for dataset ID 558908

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Parameters

Parameter	Description	Units
Cast	CTD Cast Identifier	text
Date	Date (GMT)	YYYYMMDD
Time	Time (GMT)	HHMM
ISO_Date_Time	Date/Time (GMT (ISO formatted)	YYYY-MM-DDTHH:MM:SS[.xx]Z
Latitude	Latitude (South is negative)	decimal degrees
Longitude	Longitude (West is negative)	decimal degrees
Depth	Sample depth	meters
Niskin	Niskin Bottle Number	integer
Sample_Num	Sample Number	integer

Filt_vol	Volume Filtered	liters
Chl_C3	Chlorophyll c3	ng/L
Chl_lide	Chlorophyllide	ng/L
MgDvp	Magnesium-2;4-divinyl	ng/L
Chl_C2	Chlorophyll c2	ng/L
Chl_C1	Chlorophyll c1	ng/L
Peridinin	Peridinin	ng/L
Ph_ide	Pheophorbide a	ng/L
But19	19'-butanoyloxyfucoxanthin	ng/L
Fuco	Fucoxanthin	ng/L
Neo	Neoxanthin	ng/L
Prasino	Prasinoxanthin	ng/L
Viola	Violaxanthin	ng/L
Hex19	19'-hexanoyloxyfucoxanthin	ng/L
DD	Diadinoxanthin	ng/L
cis_Fuco	cis-Fucoxanthin	ng/L
Allo	Alloxanthin	ng/L
Diato	Diatoxanthin	ng/L
Monad	Monadoxanthin	ng/L

Zeax	Zeaxanthin	ng/L
Lutein	Lutein	ng/L
Croco	Crocoxanthin	ng/L
Chl_b	Chlorophyll b	ng/L
Chlorophyll_c2_MGDG	Chlorophyll c2 MGDG	ng/L
Chlorophyll_a_allomer	Chlorophyll a allomer	ng/L
DV_Chl_a	Divinyl chlorphyll a	ng/L
Chl_a	Chlorophyll a	ng/L
Ph_tin	Phaeophytin a	ng/L
a_Car	Alpha-carotene	ng/L
b_Car	Beta-carotene	ng/L
Total_Chl_a	Total Chlorophyll a	ng/L

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Instruments

Dataset-specific Instrument Name	Trimble GPS - PCODE
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	HPLC
Generic Instrument Name	High-Performance Liquid Chromatograph
Dataset-specific Description	Chlorophyll and accessory pigment composition was analyzed by high performance liquid chromatography (HPLC; Agilent 1100).
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.

Dataset-specific Instrument Name	Sea-Bird 911+ CTD
Generic Instrument Name	Sea-Bird SBE 911plus CTD
Dataset-specific Description	Nathaniel B. Palmer Systems and Specifications
Generic Instrument Description	[tethered, real-time] 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

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Deployments

NBP1302

Website	https://www.bco-dmo.org/deployment/547873
Platform	RVIB Nathaniel B. Palmer
Report	http://dmoserv3.whoi.edu/data_docs/TRACERS/NBP1302_data_report.pdf
Start Date	2013-02-12
End Date	2013-04-05
Description	Ross Sea, Antarctica (53 days) RVIB Nathaniel B. Palmer : February-April 2013 McMurdo Station, Antarctica - Punta Arenas, Chile Project Title: “TRacing the fate of Algal Carbon Export in the Ross Sea” (TRACERS) Chief Scientist: Dennis Hansell, UM-RSMAS Project Description: The research focus of this cruise was to investigate the biogeochemistry associated after a phytoplankton bloom at the end of the Antarctic Austral Summer. I helped analyze and coordinate analyses of nutrients (silicic acid, phosphate, and nitrate) and collect samples for dissolved organic carbon (DOC). Note R2R Link takes user to Marine Geoscience Data System (MGDS): NBP1302 Nathaniel B. Palmer Systems and Specifications

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Project Information

TRacing the fate of Algal Carbon Export in the Ross Sea (TRACERS)

Coverage: Ross Sea

Sinking particles are a major element of the biological pump and they are commonly assigned to two fates: mineralization in the water column and accumulation at the seafloor. However, there is another fate of export hidden within the vertical decline of carbon, the transformation of sinking organic matter to fine suspended and/or dissolved organic fractions. This process has been suggested but has rarely been observed or quantified. As a result, it is presumed that the solubilized fraction is largely mineralized over short time scales. However, global ocean surveys of dissolved organic carbon are demonstrating a significant water column accumulation of organic matter under high productivity environments. This proposal will investigate the transformation of organic particles from sinking to solubilized phases of the export flux in the Ross Sea. The Ross Sea experiences high export particle production, low dissolved organic carbon export with overturning circulation, and the area has a predictable succession of production and export events. In addition, the basin is shallow (< 1000 m) so the products the PIs will target are relatively concentrated. To address the proposed hypothesis, the PIs will use both well-established and novel biochemical and optical measures of export production and its fate. The outcomes of this work will help researchers close the carbon budget in the Ross Sea.

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Funding

Funding Source	Award
NSF Division of Polar Programs (NSF PLR)	PLR-1142065

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