Niskin bottle data (including salinity, O2, temperature, conductivity, turbidity) from R/V Knorr cruise KN207-01 in the southern tip of Nova Scotia to Bermuda in 2012 (SargassoSeaLipids project)

Website: https://www.bco-dmo.org/dataset/3774
Version: 13 Nov 2012
Version Date: 2012-11-13

Project
» Biogeochemical Impact and Fate of Non-phosphorus Membrane Lipids in the Sargasso Sea (SargassoSeaLipids)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Dataset Description

Niskin bottle data from CTD casts from the KN207-01 cruise. The raw bottle data was processed using Seasave software version 7.21e (QA/QC has not been performed).

Methods & Sampling

Header information from Sea-Bird SBE 9 Bottle (.btl) Data file:
Temperature SN = 4406; Conductivity SN = 1474
Number of Bytes Per Scan = 40; Number of Voltage Words = 5
Number of Scans Averaged by the Deck Unit = 1

Sensor Channel 1: Frequency 0, Temperature; Sensor ID = 55; Serial Number = 4406
Calibration Date: 14-Feb-12
UseG_J: 1
A: 0.00000000e+000; B: 0.00000000e+000; C: 0.00000000e+000; D: 0.00000000e+000; F0_Old: 0.000
G: 4.33630903e-003
H: 6.36463726e-004
I: 2.06290680e-005
J: 1.71729728e-006

F0: 1000.000
Slope: 1.00000000; Offset: 0.0000

Sensor Channel 2: Frequency 1, Conductivity; Sensor ID = 3; Serial Number = 1474
Calibration Date: 14-Feb-12
UseG_J: 1; Cell const and series R are applicable only for wide range sensors.
SeriesR: 0.0000; CellConst: 2000.0000; ConductivityType: 0
Coefficients equation = 0
A: 0.00000000e+000; B: 0.00000000e+000; C: 0.00000000e+000; D: 0.00000000e+000 M: 0.0
CPcor: -9.57000000e-008
Coefficients equation = 1
G: -4.21351634e+000
H: 5.39243337e-001
I: -2.08827162e-004
J: 3.95099976e-005
CPcor: -9.57000000e-008; CTcor: 3.2500e-006
WBOTC not applicable unless ConductivityType = 1.
WBOTC: 0.00000000e+000
Slope: 1.00000000; Offset: 0.00000

Sensor Channel 3: Frequency 2, Pressure, Digiquartz with TC; Sensor ID = 45; Serial Number = 69685 in 090484 vertical orientation
Calibration Date: 12/18/2002
C1: -4.680530e+004; C2: -8.320595e-001; C3: 1.450810e-002
D1: 3.903100e-002; D2: 0.000000e+000
T1: 3.038361e+001; T2: -5.411459e-004; T3: 4.085080e-006; T4: 2.564540e-009
Slope: 0.99995000; Offset: 0.00000
T5: 0.000000e+000
AD590M: 1.280820e-002; AD590B: -9.210198e+000

Sensor Channel 4: Frequency 3, Temperature, 2; Sensor ID = 55; Serial Number = 2271
Calibration Date: 14-Feb-12
UseG_J: 1
A: 0.00000000e+000; B: 0.00000000e+000; C: 0.00000000e+000; D: 0.00000000e+000; F0_Old: 0.000
G: 4.33365550e-003
H: 6.41046238e-004
I: 2.31654312e-005
J: 2.15092946e-006
F0: 1000.000
Slope: 1.00000000; Offset: 0.0000

Sensor Channel 5: Frequency 4, Conductivity, 2; Sensor ID = 3; Serial Number = 2707
Calibration Date: 14-Feb-12
UseG_J: 1; Cell const and series R are applicable only for wide range sensors.
SeriesR: 0.0000
CellConst: 2000.0000
ConductivityType: 0
Coefficients equation = 0
A: 0.00000000e+000; B: 0.00000000e+000; C: 0.00000000e+000; D: 0.00000000e+000; M: 0.0
CPcor: -9.57000000e-008
Coefficients equation = 1
G: -1.07258216e+001
H: 1.55968861e+000
I: -1.50749109e-003
J: 2.09512327e-004
CPcor: -9.57000000e-008; CTcor: 3.2500e-006
WBOTC not applicable unless ConductivityType = 1.
WBOTC: 0.00000000e+000
Slope: 1.00000000; Offset: 0.00000

Sensor Channel 6: A/D voltage 0, Fluorometer, WET Labs ECO-AFL/FL; Sensor ID = 20; Serial Number = FLNTURTD-1013
Calibration Date: april 18, 2008

ScaleFactor: 6.00000000e+000
Vblank: 0.0800

Sensor Channel 7: A/D voltage 1, User Polynomial; Sensor ID = 61; Serial Number = FLNTURTD-1013
Calibration Date: april 18, 2008
SensorName: turbidity
A0: 0.15800000
A1: 2.00000000
A2: 0.00000000
A3: 0.00000000

Sensor Channel 8: A/D voltage 2, PAR/Irradiance, Biospherical/Licor; Sensor ID = 42; Serial Number = 4550
Calibration Date: 13-Mar-2008
M: 1.00000000
B: 0.00000000
CalibrationConstant: 77519400000.00000000
Multiplier: 1.00000000
Offset: -0.01906000

Sensor Channel 9: A/D voltage 3, Transmissometer, Chelsea/Seatech/WET Lab CStar; Sensor ID = 59; Serial Number = CST-1117DR
Calibration Date: 05-Aug-2011
M: 21.0530
B: -0.1537
PathLength: 0.250

Sensor Channel 10: A/D voltage 4, Altimeter; Sensor ID = 0; Serial Number = 1133
Calibration Date:
ScaleFactor: 14.950
Offset: 0.200

Sensor Channel 11: A/D voltage 5, Oxygen, SBE 43; Sensor ID = 38; Serial Number = 0723
Calibration Date: 11-Feb-12
Use2007Equation: 1
CalibrationCoefficients equation = 0
  Coefficients for Owens-Millard equation:
  Boc: 0.0000; Soc: 0.0000e+000
  Offset: 0.0000
  Pcor: 0.00e+000; Tcor: 0.0000
  Tau: 0.0
CalibrationCoefficients equation = 1
  Coefficients for Sea-Bird equation - SBE calibration in 2007 and later.
  Soc: 5.5281e-001
  Offset: -0.5125
  A: -2.4781e-003
  B: 9.2148e-005
  C: -1.8426e-006
  D0: 2.5826e+000
  D1: 1.92634e-004
  D2: -4.64803e-002
  E: 3.6000e-002
  Tau20: 1.3300
  H1: -3.3000e-002
  H2: 5.0000e+003
  H3: 1.4500e+003

Sensor Channel 12: A/D voltage 6, Free
Sensor Channel 13: A/D voltage 7, Free
Sensor Channel 14: SPAR voltage, Unavailable

Sensor Channel 15: SPAR voltage, SPAR/Surface Irradiance; Sensor ID = 51; Serial Number = 6294
Calibration Date: 2008-03-13
ConversionFactor: 1826.90000000

RatioMultiplier: 1.00000000

datcnv_ox_hysteresis_correction = yes
datcnv_ox_tau_correction = yes
datcnv_bottle_scan_range_source = scans marked with bottle confirm bit, 0, 5
bottlesum_ox_tau_correction = yes

Data Processing Description

Raw data was processed using Seasave software version 7.21e. BCO-DMO retrieved the processed data from the ship's hard drive and made the following edits to the bottle (.btl) files:
- Changed parameter names to conform to BCO-DMO conventions;
- Converted latitude and longitude from degrees and decimal minutes to decimal degrees;
- Added cast, date, time_start, lat_start, lon_start from the CTD file headers;
- Separated day_gmt, month_gmt, year, and time_gmt into separate columns from the original Date and Time fields.
- Bottle file '20101052' (bottle data from cast 52),contained only invalid/undecipherable values. Possible instrument or processing failure, or data file corruption. BCO-DMO replaced these data with 'nd' to indicate 'no data'.

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Data Files

File
KN207-01_bottle.csv (Comma Separated Values (.csv), 575.42 KB) MD5:c4198ffb355c503d2080eabb6d4215f9 Primary data file for dataset ID 3774

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Parameters

Parameter	Description	Units
cast	CTD cast number.	dimensionless
date_start	Date (GMT) at the start of the CTD cast in YYYYmmdd format.	dimensionless
time_start	Time (GMT) at start of the CTD cast in HHMM format (seconds have been rounded to the nearest minute).	dimensionless
lat_start	Latitude in decimal degrees at start of CTD cast; negative = South.	decimal degrees
lon_start	Longitude in decimal degrees at start of CTD cast; negative = West.	decimal degrees
bottle	Niskin bottle number. Originally named 'Bottle Position'.	unitless
time_gmt	Time (GMT) the bottle was fired. In hours, minutes, and decimal minutes; 24-hour clock.	HHMM.mm
day_gmt	2-digit day of month (GMT) when the bottle was fired.	dd (01 to 31)
month_gmt	2-digit month (GMT) when the bottle was fired.	mm (01 to 12)
year	4-digit year (GMT) when the bottle was fired.	YYYY
press_avg	Average pressure. Column originally named 'PrDM'.	decibars

press_sd	Standard deviation of press_avg.	decibars
press_min	Minimum pressure.	decibars
press_max	Maximum pressure.	decibars
depth_avg	Average depth. Column originally named 'DepSM'.	meters
depth_sd	Standard deviation of depth_avg.	meters
depth_min	Minimum depth.	meters
depth_max	Maximum depth.	meters
potemp	Potential temperature from primary sensor. Originally named 'Potemp090C'.	degrees C
potemp2	Potential temperature from secondary sensor. Originally named 'Potemp190C'.	degrees C
sal	Salinity from the primary sensor. Originally named 'Sal00'.	PSU
sal2	Salinity from the secondary sensor. Originally named 'Sal11'.	PSU
O2	Oxygen in milliliters per liter measured by the SBE 43. Originally named 'Sbeox0ML/L'.	mL/L
O2_sat_pcnt	Percent oxygen saturation. Originally named 'Sbeox0PS'.	%
sigma_0	Density, sigma-theta, in kilograms per cubic meter from primary sensor. Originally named 'Sigma_e00'.	kg/m^3
sigma_0_2	Density, sigma-theta, in kilograms per cubic meter from secondary sensor. Originally named 'Sigma-e11'.	kg/m^3
sigma_t	Sigma-t density from primary sensor. Originally named 'Sigma-t00'.	kg/m^3
sigma_t_2	Sigma-t density from secondary sensor. Originally named 'Sigma-t11'.	kg/m^3
temp_avg	Average temperature from primary sensor. Column originally named 'T090C'.	degrees C
temp_sd	Standard deviation of temp_avg.	degrees C
temp_min	Minimum temperature from primary sensor.	degrees C
temp_max	Maximum temperature from primary sensor.	degrees C
temp2_avg	Average temperature from secondary sensor. Column originally named 'T190C'.	degrees C
temp2_sd	Standard deviation of temp2_avg.	degrees C
temp2_min	Minimum temperature from secondary sensor.	degrees C
temp2_max	Maximum temperature from secondary sensor.	degrees C
cond_avg	Average conductivity in Siemens per meter from primary sensor. Column originally named 'C0S/m'.	S/m
cond_sd	Standard deviation of cond_avg.	S/m
cond_min	Minimum conductivity from primary sensor.	S/m
cond_max	Maximum conductivity from primary sensor.	S/m
cond2_avg	Average conductivity in Siemens per meter from secondary sensor. Column originally named 'C1S/m'.	S/m
cond2_sd	Standard deviation of cond2_avg.	S/m
cond2_min	Minimum conductivity from secondary sensor.	S/m
cond2_max	Maximum conductivity from secondary sensor.	S/m
O2_v_avg	Average raw oxygen reading from the SBE 43. Column originally named 'Sbeox0V'.	volts
O2_v_sd	Standard deviation of O2_v_avg.	volts
O2_v_min	Minimum raw oxygen reading from the SBE 43.	volts

O2_v_max	Maximum raw oxygen reading from the SBE 43.	O2_v_max
trans_avg	Average beam transmission from Chelsea/Seatech/WET Labs CStar. Column originally named 'Xmiss'.	%
trans_sd	Standard deviation of trans_avg.	%
trans_min	Minimum beam transmission from Chelsea/Seatech/WET Labs CStar.	%
trans_max	Maximum beam transmission from Chelsea/Seatech/WET Labs CStar.	%
beam_c_avg	Average beam attenuation from Chelsea/Seatech/WET Labs CStar (in inverse meters). Column originally named 'Bat'.	1/m
beam_c_sd	Standard deviation of beam_c_avg.	1/m
beam_c_min	Minimum beam attenuation from Chelsea/Seatech/WET Labs CStar (in inverse meters).	1/m
beam_c_max	Maximum beam attenuation from Chelsea/Seatech/WET Labs CStar (in inverse meters).	1/m
fluor_avg	Average fluorescence from WET Labs ECO-AFL/FL in milligrams per cubic meter. Column originally named 'FlECO-AFL'.	mg/m^3
fluor_sd	Standard deviation of fluor_avg.	mg/m^3
fluor_min	Minimum fluorescence from WET Labs ECO-AFL/FL in milligrams per cubic meter.	mg/m^3
fluor_max	Maximum fluorescence from WET Labs ECO-AFL/FL in milligrams per cubic meter.	mg/m^3
turbidity_avg	Average turbidity. Column originally named 'Upoly0'.	NTU
turbidity_sd	Standard deviation of turbidity_avg.	NTU
turbidity_min	Minimum turbidity.	NTU
turbidity_max	Maximum turbidity.	NTU
scan_avg	Average scan number.	unitless
scan_sd	Standard deviation of scan_avg.	unitless
scan_min	Minimum scan number.	unitless
scan_max	Maximum scan number.	unitless

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Instruments

Dataset-specific Instrument Name	Niskin bottle
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

KN207-01

Website	https://www.bco-dmo.org/deployment/58787
Platform	R/V Knorr
Start Date	2012-04-21
End Date	2012-05-04
Description	Projected Science Plan: The plan is to conduct two, 5-day quasi-lagrangian time-series stations at 65W, one north of the Gulf Stream and one south of the Gulf Stream. The daily cruise track will be centered around following free-floating sediment net traps arrays. The traps will be retrieved and re-deployed on 24 hour intervals (generally beginning at day break). CTD casts, primarily in the upper 250 meters, will be done in the afternoons, with McLane pumps deployed overnight. This cruise is funded by NSF OCE-1031143. More information about this cruise is available from the vessel operator (WHOI cruise synopsis). Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

Biogeochemical Impact and Fate of Non-phosphorus Membrane Lipids in the Sargasso Sea (SargassoSeaLipids)

Coverage: Sargasso Sea

Intact polar diacyglycerols (IP-DAGs) are the fatty-acid bearing lipid molecules that compose bacterial and eukaryotic cell membranes. As such, they are one of the most abundant classes of lipid molecules in plankton, and play a major role in the marine carbon cycle. However, until very recently, the molecular diversity of IP-DAGs was poorly understood; the structural identity and characteristics of IP-DAGs were inferred almost exclusively from their constituent fatty acids. These non-phosphorus containing IP-DAGs were largely unknown to chemical oceanography. In contrast, phospholipids, which have been the focus of considerable research, compose a disproportionally small fraction of total IP-DAGs. But we still lack even a cursory understanding of biochemical functions and geochemical fates of non-phosphorus IP-DAGs. Given that these molecules are among the most abundant lipid molecules on the planet, this represents a profound and unexpected gap in our understanding the marine carbon and phosphorus cycles.

In this project, researchers at the Woods Hole Oceanographic Institution will launch a pioneering study of these poorly understood compounds. Their approach will be guided by four questions: (1) How do non-phosphorus lipids contribute to variations in the C:N:P of particulate organic matter in the Sargasso Sea? (2) What are the relative degradation rates of phospholipids and non-phosphorus lipids in surface waters? (3) Which groups of microbes utilize the carbon and phosphorus from different IP-DAGs? (4) What are the relative contributions of different IP-DAGs to particulate organic matter export to the deep-sea?

These questions will be answered by using sophisticated HPLC/MS analyses and novel isotope tracing approaches in conjunction with long-standing methods for measuring the C:N:P of plankton and determining the degradation rates of organic molecules. The research team will establish whether these newly-recognized sulfolipids and betaine lipids molecules are a quantitatively important biochemical option for phytoplankton to affect flexible C:N:P stoichiometry in the face of nutrient stress. They will also elucidate the degradation rate, microbial fate, and export potential of the carbon and phosphorus from IP-DAGs. This will shed new light on the broader roles of these molecules in the cycling of these elements by the planktonic community.

This project contains components that are specifically designed to meet the NSF criteria for "advancing discovery and understanding while promoting teaching, training and learning." The project will support the training of a graduate student and postdoctoral fellow. In addition, the research team will work with the non-profit Zephyr Foundation in Woods Hole to design educational 'units' based on the team's research that will be tailored to student in grades 6 - 12. The Foundation will present these units as part of their hands-on marine

science field trip series that is delivered to over 200 students and their teachers per year.

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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-1031143

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