CTD profiles 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/3666
Version: 17 July 2012
Version Date: 2012-07-17

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

CTD data from a SeaBird 911+ collected during the KN207-01 cruise for the project 'Biogeochemical Impact and Fate of Non-phosphorus Membrane Lipids in the Sargasso Sea'.

Methods & Sampling

See the CTD Configuration Report (PDF).

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 downcast data files:
- Replaced values of '-9.99e-29' with 'nd' to represent 'no data';
- Changed parameter names to conform to BCO-DMO conventions;
- Converted latitude and longitude from degrees and decimal minutes to decimal degrees;
- Removed a duplicate depth parameter;
- Added cast, date, time_start, lat_start, lon_start from the CTD file headers (time rounded to nearest minute).

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Data Files

File
KN207-01_CTD_profiles.csv (Comma Separated Values (.csv), 5.82 MB) MD5:d5a560bdb63b7816ea58b5f9b499c9dc Primary data file for dataset ID 3666

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Parameters

Parameter	Description	Units
cast	CTD cast number.	dimensionless
date	Date (GMT) 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
press	Water pressure, in decibars (db).	decibars
depth	Sample depth.	meters
temp	Temperature in degrees Celsius.	degrees C
temp2	Temperature (in degrees Celsius) measured by secondary sensor.	degrees C
cond	Conductivity measured in Siemens per meter.	S/m
cond2	Conductivity (in Siemens per meter) measured by secondary sensor.	S/m
sal	Salinity (in practical salinity units, PSU).	PSU
sal2	Salinity (in PSU) measured by the secondary sensor.	PSU
O2_v	Raw oxygen reading in volts; from SBE43 sensor.	volts
O2	Oxygen measured in mL/L; from SBE43 sensor.	mL/L
trans	Beam transmission, as a percentage; from the WET Labs CStar transmissometer.	%
beam_c	Beam attenuation; from WET Labs CStar transmissometer.	1/m
fluor	Fluorescence (in mg per cubic meter); from WET Labs ECO-AFL fluorometer.	mg/m^3
turbidity	Turbidity.	N/A
par	Irradiance; from Biospherical Instruments PAR sensor.	microEinsteins/meter^2/second
SPAR	Surface Irradiance.	microEinsteins/meter^2/second
sigma_0	Density (sigma-theta).	kg/m^3
sigma_0_2	Density (sigma-theta) from secondary sensor.	kg/m^3
potemp	Potential temperature (ITS-90, degrees Celsius).	degrees C
potemp2	Potential temperature (ITS-90, degrees Celsius) from secondary sensor.	degrees C
sal_diff	Practical salinity difference (sal2 - sal).	PSU
temp_diff	Temperature difference (temp2 - temp).	degrees C
cond_diff	Conductivity difference (cond2 - cond).	S/m
O2sat	Oxygen saturation in mL/L; calculated using Garcia & Gordon method.	mL/L
sound_vel	Sound velocity (in meters per second).	m/s
geopot_anom	Geopotential anomaly measured in joules per kilogram.	J/kg

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Description	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

Dataset-specific Instrument Name	LI-COR Biospherical PAR Sensor
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Generic Instrument Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

Dataset-specific Instrument Name	Wet Labs ECO-AFL/FL Fluorometer
Generic Instrument Name	Wet Labs ECO-AFL/FL Fluorometer
Generic Instrument Description	The Environmental Characterization Optics (ECO) series of single channel fluorometers delivers both high resolution and wide ranges across the entire line of parameters using 14 bit digital processing. The ECO series excels in biological monitoring and dye trace studies. The potted optics block results in long term stability of the instrument and the optional anti-biofouling technology delivers truly long term field measurements. more information from Wet Labs

Dataset-specific Instrument Name	Wet Labs CSTAR Transmissometer
Generic Instrument Name	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
Generic Instrument Description	The C-Star transmissometer has a novel monolithic housing with a highly intgrated opto-electronic design to provide a low cost, compact solution for underwater measurements of beam transmittance. The C-Star is capable of free space measurements or flow-through sampling when used with a pump and optical flow tubes. The sensor can be used in profiling, moored, or underway applications. Available with a 6000 m depth rating. More information on Sea-Bird website: https://www.seabird.com/c-star-transmissometer/product?id=60762467717

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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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