Alongtrack data collected continuously by the ship's underway acquisition system 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/3663
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
Van Mooy, Benjamin A.S.	Woods Hole Oceanographic Institution (WHOI)	Chief Scientist
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

This alongtrack data was recorded by the R/V Knorr's data logging system, Calliope, during the KN207-01 cruise from 04/21/12 to 05/04/12.

Methods & Sampling

A .csv file was generated for each day of the cruise. Each file normally starts at midnight GMT and data is added approximately once per minute. The following were known problems with data acquisition:

(1) Data should be considered faulty from 16:30 GMT until 22:00 GMT on April 21, 2012 due to a failure of the Science Saltwater System pump for the following parameters: sal_ss_SBE, temp_ss5_2, sal_ss, cond_mS, and flr.
(2) Surface PAR (par_scalar_s) readings may be artificially low during the period from 12:20 to 12:40 GMT on April 26, 2012. (The sensor was covered during this time with double-thick window screen mesh as part of an experiment.)
(3) On April 30, 2012 from 10:40 to 11:00 GMT, underway fluorometer and SBE45 sensors were flushed with freshwater and the fluorometer cell was cleaned. Parameters effected are: sal_ss_SBE, temp_ss5_2, sal_ss, cond_mS, and flr.

Data Processing Description

BCO-DMO retrieved the .csv files from the ship's hard drive and the following edits were made: blank values were replaced with 'nd' to indicate 'no data'; time_gmt, month_gmt, and day_gmt were reformatted; yrday was calculated and added based on the date; parameter names were changed to conform to BCO-DMO conventions; the following parameters were removed from display:
Depth35 (3.5 kHz depth) - all values were 0 or nd.
SBE45C - duplication of cond_mS; both parameters are sea surface conductivity from the primary source (SBE45).
SBE48T - duplication of temp_ss; both parameters are sea surface temp from the primary sensor (SBE48).
WXTS_Ta (air temp starboard) - values are identical to temp_air.
WXTS_Pa (press_bar starboard) - values are identical to press_bar.
WXTP_Ua (humidity port) - values are identical to humidity.

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Data Files

File
KN207-01_alongtrack.csv (Comma Separated Values (.csv), 4.74 MB) MD5:3ce3e6c73d38c852fed8552e30b24080 Primary data file for dataset ID 3663

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Parameters

Parameter	Description	Units
date	month, day, year in MM/DD/YY format (GMT time) e.g. 04/23/12 = April 23, 2012.	dimensionless
time_gmt	Time GMT, 24 hour clock. Values converted from HH:MM:SS format to HHMM.SS format.	decimal hours
lat	Latitude, negative = South.	decimal degrees
lon	Longitude, negative = West.	decimal degrees
sog	Speed-over-ground (knots) obtained from GPS (primary SOG data).	knots
head	Ship's heading (degrees true); this is the ship's primary heading data. Originally named 'HDT'.	degrees true
cog	Course-over-ground (true) in degrees obtained from the GPS.	degrees
temp_ss5_2	Sea surface temperature measured by SBE45 sensor located in main lab. Intake located 5 meters below water level. Originally named'SBE45T'.	degrees C
sal_ss	Sea surface salinity calculated from the temperature and conductivity values measured by the SBE45 (temp_ss5_2 and cond_mS). Calculations made in accordance with UNESCO 44. Originally named 'Salinity'.	PSU
month_gmt	Month of year (01-12), GMT. Values derived from the 'date' field.	dimensionless
day_gmt	Day of month (0-31), GMT. Values derived from the date field.	dimensionless
cond_mS	Sea surface conductivity from the primary source (SBE45). Originally named 'SSCND'.	mS/cm

sound_vel	Sea surface sound velocity calculated from salinity and temperature values (sal_ss and temp_ss5). Originally named 'SSV'.	m/s
wind_speed_r_port	Relative wind speed, port side, from the Vaisala WXT520. Wind sampling done at 2 Hz and averaged over 10 seconds. Originally named 'WXTP_Sm'.	m/s
wind_speed_r_stbd	Relative wind speed, stbd side, obtained from Vaisala WXT520. Wind sampling done at 2 Hz and averaged over 10 seconds. Originally named 'WXTS_Sm'.	m/s
wind_speed_c_port	True wind speed, port side. Values calculated from the Vaisala WXT520. Raw data corrected for sensor alignment error and combined with the ship's heading, sog, and cog values. Originally named 'WXTP_TS'.	m/s
wind_speed_c_stbd	True wind speed, stbd side. Values calculated from the Vaisala WXT520. Raw data corrected for sensor alignment error and combined with the ship's heading, sog, and cog values. Originally named 'WXTS_TS'.	m/s
wind_speed_c	True wind speed from primary wind sensor (IMET). Calculations use heading, sog, and cog values. Originally named 'Wnd_TS'.	m/s
year	year (YYYY format); derived from date column.	dimensionless
yrday	yearday; derived from date column.	dimensionless
temp_air_port	Air temperature in degrees C. Obtained from Vaisala WXT520 sensor mounted on forward mast, port side, 15.5 m above waterline. Originally named 'WXTP_TA'.	degrees C
temp_air	Air temperature in degrees C. Originally named 'AT'.	degrees C
depth_w_12	12 kHz depth (in meters) from sea surface obtained from the Knudsen bathymetry system. Originally named 'Depth12'.	m
wind_dir_r_port	Relative wind direction from port-side Vaisala WXT520. Data has not been corrected for sensor mounting alignment error. A 0-degree wind comes over the bow; 90-degree wind comes over the stbd side. Originally named 'WXTP_Dm'.	degrees (ship relative)
wind_dir_r_stbd	Relative wind direction from stbd-side Vaisala WXT520. Data has not been corrected for sensor mounting alignment error. A 0-degree wind comes over the bow; 90-degree wind comes over the stbd side. Originally named 'WXTS_Dm'.	degrees (ship relative)
wind_dir_c_port	True wind direction in degrees, port side. Calculated from the Vaisala WXT520. Raw data corrected for sensor alignment error and combined with gyro heading, sog, and cog values. Originally named 'WXTP_TD'.	degrees
wind_dir_c_stbd	True wind direction in degrees, stbd side. Calculated from the Vaisala WXT520. Raw data corrected for sensor alignment error and combined with gyro heading, sog, and cog values. Originally named 'WXTS_TD'.	degrees
wind_dir_c	True wind direction from the primary sensor (IMET). Calculations use heading, sog, and cog data values. Originally named 'Wnd_TD'.	degrees
press_bar_port	Barometric pressure obtained from Vaisala WXT520. Data has been corrected for 15.5 meter mast height (0.1185 millibars per meter). Originally named 'WXTP_Pa'.	millibars
press_bar	Barometric pressure obtained from primary source (IMET). Values have been corrected for 15.5 meter mast height (0.1185 millibars per meter). Originally named 'BPR'.	millibars
precip_port	Rain accumulation in mm. Data obtained from Vaisala WXT520 mounted on forward mast, port side, 15.5 m above waterline. The accumulation value is reset only when the sensor power is reset. Originally named 'WXTP_Rc'.	mm

precip_stbd	Rain accumulation in mm. Data obtained from Vaisala WXT520 mounted on forward mast, stbd side, 15.5 m above waterline. The accumulation value is reset only when the sensor power is reset. Originally named 'WXTS_Rc'.	mm
precip_rate_port	Rain intensity in mm/hour obtained from Vaisala WXT520 mounted on forward mast, port side, 15.5 m above waterline. Originally named 'WXTP_Ri'.	mm/hr
precip_rate_stbd	Rain intensity in mm/hour obtained from Vaisala WXT520 mounted on forward mast, stbd side, 15.5 m above waterline. Originally named 'WXTS_Ri'.	mm/hr
humidity	Relative humidity (%) from best source. Sensor is mounted on the forward mast, 15.5 meters above the waterline. Originally named 'HRH'.	%
humidity_stbd	Relative humidity (%) obtained from Vaisala WXT520 mounted on forward mast, stbd side, 15.5 m above water line. Originally named 'WXTS_Ua'.	%
flr	Fluorescence measured by WetLabs Wet-Star fluorometer located in the Hydro Lab clean seawater piping. Measured in volts dc converted to MetraByte serial (count) data. 1 volt dc = +0100.00 counts.	counts
radiation_s	Short wave radiation in watts/square-meter. The Eppley pyranometer has a wavelength range of 0.3 to 3 um. Sensor is mounted on bow mast 15.5 m above the waterline. Originally named 'SWR'.	watts/meter^2
radiation_l	Long wave radiation.	watts/meter^2
SPAR	Surface irradiance (or surface PAR) measured by QSR-2240A sensor. Surface irradiance values were calculated by dividing the net voltage reading by the calibration scale factor of 6.0452 V/(uE/cm^2/sec).	uE/cm^2/sec
temp_ss5	Sea surface temperature from primary sensor (SBE48) located in the bow chamber ~5 meters below water level. Originally named 'SSTMP'.	degrees C
sal_ss_SBE	Surface salinity from SBE45 located in main lab. This value is provided by the instrument rather than being calculated from the temperature and conductivity values. (For calculated salinity, see sal_ss.) Originally named 'SBE45S'.	PSU
speedlog	Ship speed through the water in knots, from the Furuno Speedlog. Originally named 'SPD'.	knots

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Instruments

Dataset-specific Instrument Name	Fluorometer
Generic Instrument Name	Fluorometer
Dataset-specific Description	Wetlabs Wet-Star fluorometer located in the Hydro Lab clean seawater piping. A MetraByte A/D converter is used to convert the 0 - 5 volt dc fluorometer output to serial (count) data. Output: 0 - 5 VDC; 0 - 4095 counts.
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	Global Positioning System Receiver
Generic Instrument Name	Global Positioning System Receiver
Dataset-specific Description	Simrad MX512 GPS 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	Improved Meteorological Recorder
Generic Instrument Name	Improved Meteorological Recorder
Dataset-specific Description	humidity, air_temp, press_bar, true wind speed (wind_speed_c), and true wind direction (wind_dir_c) are obtained from the IMET sensors, mounted on the forward mast 15.5 meters about the waterline.
Generic Instrument Description	An IMET Recorder is an instrument package that can be mounted on a ship or buoy to record mean weather data including air and sea-surface temperature, incoming short and long-wave radiation, precipitation, humidity, wind velocity and barometric pressure. Each sensor in the system communicates digitally and returns calibrated values to a central data recorder.

Dataset-specific Instrument Name	Knudsen 320 BR deepwater echosounder
Generic Instrument Name	Knudsen 320 BR deepwater echosounder
Dataset-specific Description	Knudsen 320B/R with digital data logging and EPC graphic recorder. 12 kHz and 3.5 kHz transducers are 5 meters below the surface.
Generic Instrument Description	The Knudsen 320 B/R deepwater echosounder is a digital data logging system used to measure water depth (e.g. depth of the seafloor). The system is configured to work with different frequency transducers. For example, the Edo 323 B is a 12 kHz High Frequency (HF) transducer or it can be configured to work with an array of 3.5 kHz Low Frequency (LF) transducers mounted in the hull of a vessel.

Dataset-specific Instrument Name	SBE45 Thermosalinograph
Generic Instrument Name	MicroTSG Thermosalinograph
Dataset-specific Description	The SBE45 Thermosalinograph is mounted in the main lab and connected to the clean seawater system. The intake for the system in in the bow dome ~5 meters below water level. More information on this instrument is available on its spec sheet.
Generic Instrument Description	An externally powered, high-accuracy instrument, designed for shipboard determination of sea surface (pumped-water) conductivity and temperature. Salinity and sound velocity can also be computed.

Dataset-specific Instrument Name	QSR 2200 Biospherical Instruments
Generic Instrument Name	Photosynthetically Available Radiation Sensor
Dataset-specific Description	Surface irradiance (or surface PAR) measured by Biospherical Instruments Inc. Model QSR-2240A.
Generic Instrument Description	A PAR sensor measures photosynthetically available (or active) radiation. The sensor measures photon flux density (photons per second per square meter) within the visible wavelength range (typically 400 to 700 nanometers). PAR gives an indication of the total energy available to plants for photosynthesis. This instrument name is used when specific type, make and model are not known.

Dataset-specific Instrument Name	SBE 48 Hull Temperature Sensor
Generic Instrument Name	Sea-Bird SBE 48 Hull Temperature Sensor
Dataset-specific Description	Hull Temperature Sensor; magnetically coupled SBE48 to measure sea surface temperature through the hull. Sensor is located in the bow chamber outboard of the UCSW pump, a few feet aft of the UCSW intake. Sensor housing is contained in an insulation jacket to limit the effect of ambient bow chamber air.
Generic Instrument Description	The SBE 48 is a high-accuracy temperature recorder with non-volatile memory, designed for shipboard determination of sea surface temperature. Installed with magnets just below the water line, the SBE 48's temperature sensor is in contact with the inside of the ship's hull. For more information, see the SBE48 Manual.

Dataset-specific Instrument Name	Speedlog
Generic Instrument Name	Speedlog
Dataset-specific Description	Model: Furuno DS-50 Doppler. The DS50 measures and displays the ship's over-the-ground or through-the-water speed based on the Doppler effect.
Generic Instrument Description	Measures Doppler near surface vessel speed through the water.

Dataset-specific Instrument Name	Weather Transmitter
Generic Instrument Name	Weather Transmitter
Dataset-specific Description	Vaisala WXT520 MET sensors mounted on both port and starborad side of the forward mast 15.5 meters above the water line.
Generic Instrument Description	The ship-mounted Vaisala Weather Transmitter WXT520 measures: Wind speed and direction; Liquid precipitation: rainfall, duration, intensity; Barometric pressure; Air temperature and Relative humidity. (for more information see http://www.vaisala.com/en/products/multiweathersensors/Pages/WXT520.aspx)

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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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