

# Inorganic nutrients (PO<sub>4</sub>, SiOH<sub>4</sub>, NO<sub>3</sub>, NO<sub>2</sub>, NH<sub>4</sub>) from R/V Knorr cruise KN207-01 from the southern tip of Nova Scotia to Bermuda in 2012 (SargassoSeaLipids project)

**Website:** <https://www.bco-dmo.org/dataset/3985>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2013-06-28

## 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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## Abstract

Inorganic nutrients (PO<sub>4</sub>, SiOH<sub>4</sub>, NO<sub>3</sub>, NO<sub>2</sub>, NH<sub>4</sub>) from R/V Knorr cruise KN207-01 from the southern tip of Nova Scotia to Bermuda in 2012.

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## Coverage

**Spatial Extent:** N:41.4503 E:-65.6853 S:32.9057 W:-70.7507

**Temporal Extent:** 2012-04-21 - 2012-05-02

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## Dataset Description

PO<sub>4</sub>, SiOH<sub>4</sub>, NO<sub>3</sub>, NO<sub>2</sub>, and NH<sub>4</sub> from the KN207-01 cruise.

## Methods & Sampling

Seawater was collected with Niskin bottles. Samples were pre-filtered through a 0.2 micrometer filter into and acid-washed HDPE bottle and frozen at -20 degrees C. Samples were shipped frozen to the University of Washington Marine Chemistry Laboratory. Samples were analyzed in January 2013 on a Technicon AAll Autoanalyzer.

Analytical methods (from <http://www.ocean.washington.edu/story/Marine+Chemistry+Laboratory>):

Analysis	Method References	EPA/SM#	NELAC Code	2011 Detection Limits
PO <sub>4</sub>	UNESCO(1994)	EPA 365.5_1.4_1997	WM920270	0.03uM
SiOH <sub>4</sub>	UNESCO(1994)	EPA 366	WM920240	0.76uM
NO <sub>3</sub>	UNESCO(1994)	EPA 353.4_2_199	10068209	0.08uM
NO <sub>2</sub>	UNESCO(1994)	EPA 353.4_2_1997	10068209	0.01uM
NH <sub>4</sub>	UNESCO(1994)	EPA 349	WM920220	0.07uM
Total N	Valderrama(1981)	SM 4500-P J	WM920270	1.08uM
Total P	Valderrama(1981)	SM 4500-P J	WM920270	0.04uM

## Data Processing Description

BCO-DMO added date and lat/lon from the CTD data based on cast number.

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## Data Files

File
<b>KN207-01_inorg_nutrients.csv</b> (Comma Separated Values (.csv), 7.96 KB) MD5:0f4927520e3f51dc8849d0be145cf91c
Primary data file for dataset ID 3985

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## Parameters

Parameter	Description	Units
cast	CTD cast number.	integer
month_cast	2-digit month of the cast.	mm (01 to 12)
day_cast	2-digit day of month of the cast.	dd (01 to 31)
year	4-digit year in YYYY format.	unitless
lat_nom	Nominal latitude. Values indicate latitude at start of CTD cast. Positive = North.	decimal degrees
lon_nom	Nominal longitude. Values indicate longitude at start of CTD cast. Negative = West.	decimal degrees
depth	Sample depth, in meters.	meters
PO4	PO4 concentration. Samples were NOT pre-concentrated with MAGIC.	uM
SiOH4	SiOH4 concentration.	uM
NO3	NO3 concentration.	uM
NO2	NO2 concentration.	uM
NH4	NH4 concentration.	uM

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## Instruments

<b>Dataset-specific Instrument Name</b>	Nutrient Autoanalyzer
<b>Generic Instrument Name</b>	Nutrient Autoanalyzer
<b>Dataset-specific Description</b>	Samples analyzed by Kathy Kroglund at University of Washington in January 2013 on Technicon AAll autoanalyzer.
<b>Generic Instrument Description</b>	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

## Deployments

### KN207-01

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58787">https://www.bco-dmo.org/deployment/58787</a>
<b>Platform</b>	R/V Knorr
<b>Start Date</b>	2012-04-21
<b>End Date</b>	2012-05-04
<b>Description</b>	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.

## Project Information

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

**Coverage:** Sargasso Sea

Intact polar diacylglycerols (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 disproportionately 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 CO<sub>2</sub> 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
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1031143</a>

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