

# DOC, TDN, and Nutrients from the RVIB Nathaniel B. Palmer NBP1302 cruise in the Ross Sea during 2013 (TRACERS project)

**Website:** <https://www.bco-dmo.org/dataset/614695>

**Version:** 30 November 2015

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## Project

» [TRacing the fate of Algal Carbon Export in the Ross Sea](#) (TRACERS)

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## Dataset Description

This dataset includes water column concentrations of DOC, TDN, and nutrients collected from February 13, 2013 to March 18, 2013 along the Ross Sea shelf. Sampling focus was in the western Ross Sea along with a zonal section on 76° 30'S.

### Related files and references:

Physical data from NBP 1302 are archived by the Marine Geoscience Data System. Data held there include shipboard continuous underway (e.g., thermosalinograph and fluorescence), bathymetry, CTD, meteorological, XBT, and navigation. The project link: <http://www.marine-geo.org/tools/search/entry.php?id=NBP1302>

### DOC methodology

Dickson, A.G., Sabine, C.L., Christian, J.R. (Eds.) *Guide to best practices for ocean CO<sub>2</sub> measurements*. PICES Special Publication 3, 191.

### Phosphate methodology

K Grasshoff. **1976**. *Methods of seawater analysis*. Verlag Chemie, Weinheim

### Silicate methodology

J.D.H Strickland and T.R. Parsons. **1968**. *A Practical Handbook of Seawater Analyses*. Ottawa: Fisheries Research Board of Canada, Bulletin.

### Nitrate methodology

Braman, R.S. and S.A. Hendrix. **1989**. Nanogram nitrite and nitrate determination in biological materials by vanadium(III) reduction with chemiluminescence detection. *Anal. Chem.* *61* (24). 2715-2718.

## Methods & Sampling

### Sampling and Analytical Methodology

**DOC:** Samples were run through an inline GF/F 0.7  $\mu\text{M}$  filter by gravity filtration directly from the Niskin bottles and stored frozen in polycarbonate bottles until shore-based analyses. DOC concentrations determined by high temperature catalytic oxidation (TOC-VCPN analyzer, Shimadzu) according to Dickson et al. (2007). Hansell Deep Reference Water was used as an external standard.  
Standard deviation: 1.5  $\mu\text{M}$

**Phosphate:** Samples were stored in HDPE bottles at 4°C until analysis (within one week of sampling). Phosphate was determined colorimetrically according to Grasshoff (1976) using a fiber optic spectrophotometer (Ocean Optics) onboard *RV NBP*. Potassium phosphate monobasic ( $\text{KH}_2\text{PO}_4$ ) was used as a standard.  
Standard deviation of reference water: 0.04  $\mu\text{M PO}_4$

**Silicic Acid:** Samples were stored in HDPE bottles at 4°C until analysis (within one week of sampling). Silicic acid was determined colorimetrically according to Strickland and Parsons (1968) using a spectrophotometer onboard *RV NBP* and standardized with sodium fluorosilicate  $\text{Na}_2\text{SiF}_6$  in artificial seawater (Salinity=28 ppt).  
Standard deviation of reference water: 1.44  $\mu\text{M Si/p}$

**Nitrate (Note:  $\text{NO}_3$  refers to  $\text{NO}_2 + \text{NO}_3$ ):** Samples were stored frozen (for up to 6 months) prior to analysis in a shore-based laboratory. Sample  $\text{NO}_3$  was reduced to  $\text{NO}$  using a heated, acidic V (III) solution and determined by chemiluminescent detection of  $\text{NO}$ . [Braman and Hendrix 1989]. Potassium nitrate ( $\text{KNO}_3$ ) was used as a standard.  
Standard deviation for replicate analyses/sample: 0.2  $\mu\text{M NO}_3$

## Data Processing Description

### Data Processing:

Data converted from micromol/L to micromol/kg

#### Quality flag descriptions:

- 2: QC was performed; considered good data
- 7: QC was performed; considered bad / questionable data
- 5: Value is missing

### BCO-DMO Processing Notes

- Generated from original file "TRACERS\_DOC\_TDN\_NUTS\_Hansell2.xls" contributed by Sarah Bercovici
- Parameter names edited to conform to BCO-DMO naming convention found at [Choosing Parameter Name](#)
- Date formatted to YYYYMMDD

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## Data Files

File
<b>DOC_TDN_Nuts.csv</b> (Comma Separated Values (.csv), 85.51 KB) MD5:303b74990e06d1e3b6ca5922d3ab2164
Primary data file for dataset ID 614695

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## Parameters

Parameter	Description	Units
STATION	Station Number	dimensionless
BOTTLE	Bottle Number	dimensionless
DATE	Station Date	YYYYMMDD
LATITUDE	Latitude (South is negative)	decimal degrees
LONGITUDE	Longitude (West is negative)	decimal degrees
DEPTH	Depth	meters
SALINITY_CTD	Salinity	PSU
TEMP_CTD	Temperature	Degrees C
DOC	DOC	micromol/kg
DOC_FLAG	DOC_FLAG Quality flag descriptions: 2: QC was performed; considered good data 7: QC was performed; considered bad / questionable data 5: Value is missing	dimensionless
TDN	TDN	micromol/kg
TDN_FLAG	TDN_FLAG Quality flag descriptions: 2: QC was performed; considered good data 7: QC was performed; considered bad / questionable data 5: Value is missing	dimensionless
PHOSPHATE	PHOSPHATE	micromol/kg
PHOSPHATE_FLAG	PHOSPHATE_FLAG Quality flag descriptions: 2: QC was performed; considered good data 7: QC was performed; considered bad / questionable data 5: Value is missing	dimensionless
SILICATE	SILICATE	micromol/kg
SILICATE_FLAG	SILICATE_FLAG Quality flag descriptions: 2: QC was performed; considered good data 7: QC was performed; considered bad / questionable data 5: Value is missing	dimensionless
NITRATE	NITRATE	micromol/kg
NITRATE_FLAG	NITRATE_FLAG Quality flag descriptions: 2: QC was performed; considered good data 7: QC was performed; considered bad / questionable data 5: Value is missing	dimensionless

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## Instruments

<b>Dataset-specific Instrument Name</b>	chemiluminescent detector
<b>Generic Instrument Name</b>	Chemiluminescence NOx Analyzer
<b>Dataset-specific Description</b>	Sample NO <sub>3</sub> was reduced to NO using a heated, acidic V (III) solution and determined by chemiluminescent detection of NO. [Braman and Hendrix 1989]
<b>Generic Instrument Description</b>	The chemiluminescence method for gas analysis of oxides of nitrogen relies on the measurement of light produced by the gas-phase titration of nitric oxide and ozone. A chemiluminescence analyzer can measure the concentration of NO/NO <sub>2</sub> /NO <sub>x</sub> . One example is the Teledyne Model T200: <a href="https://www.teledyne-api.com/products/nitrogen-compound-instruments/t200">https://www.teledyne-api.com/products/nitrogen-compound-instruments/t200</a>

<b>Dataset-specific Instrument Name</b>	Sea-Bird 911+ CTD
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Dataset-specific Description</b>	Sea-Bird 911+ CTD
<b>Generic Instrument Description</b>	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

<b>Dataset-specific Instrument Name</b>	Niskin Bottle
<b>Generic Instrument Name</b>	Niskin bottle
<b>Dataset-specific Description</b>	Niskin Bottle
<b>Generic Instrument Description</b>	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.

<b>Dataset-specific Instrument Name</b>	TOC-VCPN analyzer, Shimadzu
<b>Generic Instrument Name</b>	Shimadzu TOC-V Analyzer
<b>Dataset-specific Description</b>	DOC concentrations determined by high temperature catalytic oxidation (TOC-VCPN analyzer, Shimadzu)
<b>Generic Instrument Description</b>	A Shimadzu TOC-V Analyzer measures DOC by high temperature combustion method.

<b>Dataset-specific Instrument Name</b>	fiber optic spectrophotometer (Ocean Optics)
<b>Generic Instrument Name</b>	Spectrophotometer
<b>Dataset-specific Description</b>	Phosphate was determined colorimetrically according to Grasshoff (1976) using a fiber optic spectrophotometer (Ocean Optics)
<b>Generic Instrument Description</b>	An instrument used to measure the relative absorption of electromagnetic radiation of different wavelengths in the near infra-red, visible and ultraviolet wavebands by samples.

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## Deployments

### NBP1302

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/547873">https://www.bco-dmo.org/deployment/547873</a>
<b>Platform</b>	RVIB Nathaniel B. Palmer
<b>Report</b>	<a href="http://dmoserv3.whoi.edu/data_docs/TRACERS/NBP1302_data_report.pdf">http://dmoserv3.whoi.edu/data_docs/TRACERS/NBP1302_data_report.pdf</a>
<b>Start Date</b>	2013-02-12
<b>End Date</b>	2013-04-05
<b>Description</b>	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-RSMASProject 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
<a href="#">NSF Division of Polar Programs (NSF PLR)</a>	<a href="#">PLR-1142117</a>

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