

# Bottle data from the GEOTRACES Clean Carousel sampling system (GTC) on the Arctic Section cruise (HLY1502) from August to October 2015 (U.S. GEOTRACES Arctic project)

Website: <https://www.bco-dmo.org/dataset/647259>

Data Type: Cruise Results

Version: 4

Version Date: 2019-07-29

## Project

» [U.S. Arctic GEOTRACES Study](#) (U.S. GEOTRACES Arctic)

## Program

» [U.S. GEOTRACES](#) (U.S. GEOTRACES)

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## Abstract

Bottle data from the GEOTRACES Clean Carousel sampling system (GTC) on the Arctic Section cruise (HLY1502) from August to October 2015.

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## Table of Contents

- [Coverage](#)
- [Dataset Description](#)
  - [Acquisition Description](#)
  - [Processing Description](#)
- [Parameters](#)
- [Instruments](#)

- [Deployments](#)
  - [Project Information](#)
  - [Program Information](#)
  - [Funding](#)
- 

## Coverage

**Spatial Extent:** N:89.995 E:179.5926 S:60.1727 W:-179.8082

**Temporal Extent:** 2015-08-12 - 2015-10-07

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## Dataset Description

Bottle data from the GTC CTD using the GEOTRACES Clean Carousel sampling system (GTC), GEOTRACES Arctic cruise HLY1502.

GTC CTD BOTTLE file name from the Scripps Oceanographic Data Facility (ODF):  
20160609ODU

Note: 'FLAG\_W' columns correspond to the WHP ([WOCE Hydrographic Program](#)) quality flag scheme.

## Acquisition Description

The Go-Flo bottles were rearranged between casts to eliminate the possibility of sampling bias. See the [HLY1502](#) cruise report for more information on data acquisition.

## Processing Description

### Version history:

2019-07-29: version 4: removed all "placeholder" columns containing no data (-999 only).

These columns were included in the original files from ODF to indicate the expected datasets.

All data reported from the cruise can be found on the [HLY1502 cruise page](#) or on the [U.S. Arctic GEOTRACES project page](#).

2017-05-01: new version (3) served on 2017-05-01] replaces v2: 2016-06-09. Event 6079 was revised and event 6369 was added back to the file. It was present in version 2016-05-17 but missing in version 2016-06-09. SOLUBLE\_TH and SOLUBLE\_TH\_FLAG\_W contain no data so blanks were replaced with nd for 'no data'.

2016-06-09: new version (2) served [2016-06-09], replaces v:2016-05-17.

2016-05-17: version 1 served.

### **BCO-DMO Processing:**

- added conventional header with dataset name; PI name; version date;
- added cruise\_id column;
- reformatted time as HHMM;
- changed all hyphen, slash, and decimal points in parameter names to underscores (changed TH-232\_COLL\_0.02MICR to TH\_232\_COLL\_02MICR);
- hour=2400 not legal time; changed day by one and time to 0000 (only for station 41/cast 3/event 6277);
- ZN\_DISS and ZN\_DISS\_FLAG\_W duplicated - removed pair with no data;
- 2019-07-29: removed all "placeholder" columns containing no data (-999 only); a list of the removed columns available as a tab-separated file: [GTC\\_Bottle\\_Removals\\_20190729.tsv](#)

[ [table of contents](#) | [back to top](#) ]

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## **Parameters**

<b>Parameter</b>	<b>Description</b>	<b>Units</b>
cruise_id	cruise identification	unitless
EXPOCODE	expedition code assigned by the CCHDO: NODCShipCodeYearMonthDay	unitless
SECT_ID	cruise section identification number	unitless
STNNBR	station number	unitless
CASTNO	cast number	unitless
GEOTRC_EVENTNO	GEOTRACES Event Number	unitless
GEOTRC_SAMPNO	GEOTRACES Sample Number	unitless
SAMPNO	sequential sample number within a cast	unitless
BTLNBR	Bottle Number	unitless
BTLNBR_FLAG_W	Bottle Quality Flag	unitless
DATE	Station Date (GMT); format is YYYYMMDD	unitless
TIME	Station Time (GMT); format is HHMM	unitless

ISO_DateTime_UTC	Date/Time (ISO8601 formatted); format is YYYY-MM-DDTHH:MM:SS[.xx]Z	unitless
LATITUDE	Station Latitude (South is negative)	decimal degrees
LONGITUDE	Station Longitude (West is negative)	decimal degrees
CTDPRS	CTD pressure	decibars
CTDDEPTH	CTD depth: Fofonoff-Millard depth (non-integrated; also used by SBE)	meters
CTDTMP	CTD temperature; ITS-90	degrees celsius
CTDSAL	CTD salinity	PSS-78
CTDSAL_FLAG_W	CTD salinity quality flag	unitless
SALNTY	salinity	PSS-78
SALNTY_FLAG_W	salinity quality flag	unitless
SALTREF	salinity reference ??	G/KG
SALTREF_FLAG_W	salinity reference quality flag	unitless
CTDOXY	CTD oxygen	UMOL/KG
CTDOXY_FLAG_W	CTD oxygen quality flag	unitless
BTMDEPTH	Bottom Depth	meters corrected
SILCAT	SILCAT	UMOL/KG
SILCAT_FLAG_W	SILCAT quality flag	unitless
NITRAT	nitrate	UMOL/KG
NITRAT_FLAG_W	nitrate quality flag	unitless
NITRIT	nitrite	UMOL/KG
NITRIT_FLAG_W	nitrite quality flag	unitless
PHSPHT	phosphate	UMOL/KG
PHSPHT_FLAG_W	phosphate quality flag	unitless
AL_UH	AL Uhawaii lab	NMOL/L

AL_UH_FLAG_W	AL_UH quality flag	unitless
MN_UH	MN Uhawaii lab	NMOL/L
MN_UH_FLAG_W	MN_UH quality flag	unitless
FE_UH	FE Uhawaii lab	NMOL/L
FE_UH_FLAG_W	FE_UH quality flag	unitless
HG_TOTAL	HG total	PMOL/L
HG_TOTAL_FLAG_W	HG total quality flag	unitless
HG_ELEMENTAL	HG elemental	PMOL/L
HG_ELEMENTAL_FLAG_W	HG elemental quality flag	unitless
HG_DM	HG DM	PMOL/L
HG_DM_FLAG_W	HG DM quality flag	unitless
COLLOIDAL_HG	colloidal HG	PMOL/L
COLLOIDAL_HG_FLAG_W	colloidal HG quality flag	unitless
ZN DISS	ZN dissolved	NMOL/KG
ZN DISS_FLAG_W	ZN dissolved quality flag	unitless
BTL_DATE	Bottle Date (GMT); format is YYYYMMDD	years days months
BTL_TIME	Bottle Time (GMT); format is HHMM	unitless
BTL_LAT	Bottle Latitude (South is negative)	decimal degrees
BTL_LON	Bottle Longitude (West is negative)	decimal degrees
ODF_CTDPRS	ODF CTD PRESSURE	decibars
ODF_CTDDEPTH	ODF CTD depth	meters

[ [table of contents](#) | [back to top](#) ]

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## Instruments

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

<b>Dataset-specific Instrument Name</b>	
<b>Generic Instrument Name</b>	GO-FLO Teflon Trace Metal Bottle
<b>Dataset-specific Description</b>	CTD bottle data from 30-ODF/SIOR (Ocean Data Facility 12 bottle, 30 liter Niskin rosette) and GEOTRACES Clean Carousel sampling system (GTC).
<b>Generic Instrument Description</b>	GO-FLO Teflon-lined Trace Metal free sampling bottles are used for collecting water samples for trace metal, nutrient and pigment analysis. The GO-FLO sampling bottle is designed specifically to avoid sample contamination at the surface, internal spring contamination, loss of sample on deck (internal seals), and exchange of water from different depths.

<b>Dataset-specific Instrument Name</b>	
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Dataset-specific Description</b>	The system included a Dynacon winch with 7300 m of Vectran cable with conductors, clean lab, and Seabird carousel/CTD with 24 12L GO-FLO bottles (and 14 spares), GO-FLO bottles.
<b>Generic Instrument Description</b>	The Sea-Bird SBE 911plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911plus 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 9plus and SBE 11plus is called a SBE 911plus. The SBE 9plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3plus and SBE 4). The SBE 9plus 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

[ [table of contents](#) | [back to top](#) ]

## Deployments

### HLY1502

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/638807">https://www.bco-dmo.org/deployment/638807</a>
<b>Platform</b>	USCGC Healy
<b>Report</b>	<a href="http://dmoserv3.whoi.edu/data_docs/GEOTRACES/Arctic/ARC01-report.pdf">http://dmoserv3.whoi.edu/data_docs/GEOTRACES/Arctic/ARC01-report.pdf</a>
<b>Start Date</b>	2015-08-09
<b>End Date</b>	2015-10-12
<b>Description</b>	US GEOTRACES Arctic cruise: The cruise began in Dutch Harbor, Alaska on 08 October 2015. After a station in the Bering Sea, Healy cruised to the North Pole on a westerly track before returning to the Canadian margin on an easterly track, returning to Dutch Harbor on 10 October 2015.

## Project Information

### U.S. Arctic GEOTRACES Study (U.S. GEOTRACES Arctic)

**Coverage:** Arctic Ocean; Sailing from Dutch Harbor to Dutch Harbor

Description from NSF award abstract: In pursuit of its goal "to identify processes and quantify fluxes that control the distributions of key trace elements and isotopes in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions", in 2015 the International GEOTRACES Program will embark on several years of research in the Arctic Ocean. In a region where climate warming and general environmental change are occurring at amazing speed, research such as this is important for understanding the current state of Arctic Ocean geochemistry and for developing predictive capability as the regional ecosystem continues to warm and influence global oceanic and climatic conditions. The three investigators funded on this award, will manage a large team of U.S. scientists who will compete through the regular NSF proposal process to contribute their own unique expertise in marine trace metal, isotopic, and carbon cycle geochemistry to the U.S. effort. The three managers will be responsible for arranging and overseeing at-sea technical services such as hydrographic measurements, nutrient analyses, and around-the-clock management of on-deck sampling activities upon which all participants depend, and for organizing all pre- and post-cruise technical support and scientific meetings. The management team will also lead educational outreach activities for the general public in Nome and Barrow, Alaska, to explain the significance of the study to these communities and to learn from residents' insights on observed changes in the marine system. The project itself will provide for the support and training of a number of pre-doctoral students and post-doctoral researchers. Inasmuch as the Arctic Ocean is an epicenter of global climate change, findings of this study are expected to advance present capability to forecast changes in regional and global ecosystem and climate system functioning. As the United States' contribution to the International GEOTRACES Arctic Ocean initiative, this project will be part of an ongoing multi-national effort to further scientific knowledge about trace elements and isotopes in the world ocean. This U.S. expedition will focus on the western Arctic Ocean in the boreal summer of 2015. The scientific team will consist of the management team funded through this award plus a team of scientists from U.S. academic institutions who will have successfully competed for and received NSF funds for specific science projects in time to participate in the final stages of cruise planning. The cruise track segments will include the Bering Strait, Chukchi shelf, and the deep Canada Basin.

Several stations will be designated as so-called super stations for intense study of atmospheric aerosols, sea ice, and sediment chemistry as well as water-column processes. In total, the set of coordinated international expeditions will involve the deployment of ice-capable research ships from 6 nations (US, Canada, Germany, Sweden, UK, and Russia) across different parts of the Arctic Ocean, and application of state-of-the-art methods to unravel the complex dynamics of trace metals and isotopes that are important as oceanographic and biogeochemical tracers in the sea.

[ [table of contents](#) | [back to top](#) ]

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## **Program Information**

### **U.S. GEOTRACES (U.S. GEOTRACES)**

**Website:** <http://www.geotraces.org/>

**Coverage:** Global

GEOTRACES is a SCOR sponsored program; and funding for program infrastructure development is provided by the U.S. National Science Foundation. GEOTRACES gained momentum following a special symposium, S02: Biogeochemical cycling of trace elements and isotopes in the ocean and applications to constrain contemporary marine processes (GEOSECS II), at a 2003 Goldschmidt meeting convened in Japan. The GEOSECS II acronym referred to the Geochemical Ocean Section Studies To determine full water column distributions of selected trace elements and isotopes, including their concentration, chemical speciation, and physical form, along a sufficient number of sections in each ocean basin to establish the principal relationships between these distributions and with more traditional hydrographic parameters; \* To evaluate the sources, sinks, and internal cycling of these species and thereby characterize more completely the physical, chemical and biological processes regulating their distributions, and the sensitivity of these processes to global change; and \* To understand the processes that control the concentrations of geochemical species used for proxies of the past environment, both in the water column and in the substrates that reflect the water column. GEOTRACES will be global in scope, consisting of ocean sections complemented by regional process studies. Sections and process studies will combine fieldwork, laboratory experiments and modelling. Beyond realizing the scientific objectives identified above, a natural outcome of this work will be to build a community of marine scientists who understand the processes regulating trace element cycles sufficiently well to exploit this knowledge reliably in future interdisciplinary studies. Expand "Projects"

below for information about and data resulting from individual US GEOTRACES research projects.

[ [table of contents](#) | [back to top](#) ]

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1355913</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1355833</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1356008</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1455924</a>

[ [table of contents](#) | [back to top](#) ]