Seawater concentrations of dissolved and total Th-232 and Th-230 collected from the R/V Atlantic Explorer (AE1410) cruise from Barbados to Bermuda during 2014

Website: https://www.bco-dmo.org/dataset/639016
Data Type: Cruise Results
Version: 2016-02-22

Project
» Chief Scientist Training Cruise (Barbados-Bermuda, May 2014) (NSF Chief Sci Training Barbados-Bermuda)

Contributors	Affiliation	Role
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Abstract
Seawater concentrations of dissolved and total Th-232 and Th-230 were collected from the R/V Atlantic Explorer (AE1410) cruise from Barbados to Bermuda during 2014. This dataset was collected as part of a Chief Scientist Training Cruise, May-June 2014. The focus of this research was 'Tracking Saharan dust deposition in the Northwest Atlantic using Th isotopes'. This dataset is GEOTRACES-compliant.

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Dataset Description

This dataset was collected as part of a Chief Scientist Training Cruise, May-June 2014. The focus of this research was 'Tracking Saharan dust deposition in the Northwest Atlantic using Th isotopes'. This dataset is GEOTRACES-compliant.

Methods & Sampling

Water sampling followed GEOTRACES protocols from a standard Niskin Bottle CTD/Rosette (Anderson et al. 2012). 4-5 L water samples were drained or filtered directly from Niskin bottles using Teflon-lined tygon tubing, acidified at sea with ultra-pure 6 molar hydrochloric acid, and analyzed at on-shore at MIT. Analysis involved Fe hydroxide co-precipitation, acid digestion, anion exchange chromatography and isotope dilution inductively-coupled plasma mass spectrometry. Laboratory methods were slightly modified from Anderson et al. (2012) as described by Hayes et al (2015).

References:

Anderson, R. F., M. Q. Fleisher, L. F. Robinson, R. L. Edwards, J. Hoff, S. B. Moran, M. M. Rutgers van der Loeff, A. L. Thomas, M. Roy-Barman, and R. Fran□ois (2012), GEOTRACES intercalibration of 230Th, 232Th, 231Pa, and prospects for 10Be, *Limnol. Oceanogr. Methods*, *10*, 179-213.

Hayes, C. T., R. F. Anderson, S. L. Jaccard, R. François, M. Q. Fleisher, M. Soon, and R. Gersonde (2013), A new perspective on boundary scavenging in the North Pacific Ocean, *Earth Planet. Sci. Lett.*, *369-370*(0), 86-

97, doi:http://dx.doi.org/10.1016/j.epsl.2013.03.008.

Owens, S. A., K. O. Buesseler, and K. W. W. Sims. "Re-evaluating the 238 U-salinity relationship in seawater: implications for the 238 U-234 Th disequilibrium method." Marine Chemistry 127.1 (2011): 31-39.

Data Processing Description

Th isotope concentrations are derived from measured Th-232/Th-229 and Th-230/Th-229 ratios as determined by mass spectrometry. The Th-229 spike at MIT was calibrated against a gravimetric Th standard as well as an artificial seawater standard called SWSTD 2010-1, described by Anderson et al. (2012). Corrections for ingrowth of Th-230 from dissolved U-234 during sample storage were made based on measured salinity and the U-salinity relationship of Owens et al. (2011).

The dissolved “excess” Th-230 (Th_230_D_XS) is derived by subtracting from the measured dissolved Th-230 the component sourced from the partial dissolution of lithogenic material based on measured dissolved Th-232 and a lithogenic Th-230/232 atom ratio of 4 x 10-6, as described by Hayes et al. (2013).

BCO-DMO Processing:
- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- changed longitude from positive to negative values

Cruise AE1410 was supported by UNOLS and NSF. The sample analysis was supported by the W.O. Crosby post-doctoral fellowship from MIT to Christopher Hayes.

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Data Files

File
Th_AE1410.csv (Comma Separated Values (.csv), 4.04 KB) MD5:6e2eb699b0386b96200041d8a9fcf6c9 Primary data file for dataset ID 639016

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Parameters

Parameter	Description	Units
cruise_id	cruise identification	unitless
station	station number	unitless
sample	sample number derived from cast and bottle numbers	unitless
date_start	date at start of samping	yyyymmdd
lat_start	starting latitude; north is positive	decimal degrees

lon_start	starting longitude; east is positive	decimal degrees
press	pressure	decibars
depth	depth	meters
temp_ctd	temperature from CTD	degrees Celsius
sal_ctd	salinity from CTD	unitless
O2_ctd	dissolved oxygen from CTD	umol/kg
BAC	Beam Attenuation Coefficient from the transmissometer	per meter
fluor	fluorescence	arbitrary units
Th_230_D_CONC_BOTTLE	Dissolved (<0.45 um) Th-230 concentration	uBq/kg
Th_230_D_CONC_BOTTLE_ERR	Dissolved (<0.45 um) Th-230 concentration error	uBq/kg
Th_230_D_CONC_BOTTLE_FLAG	quality flag: 1 = good; 2 = questionable; 3 = rejected	unitless
Th_230_TD_CONC_BOTTLE	Total dissolvable (from unfiltered water) Th-230 concentration	uBq/kg
Th_230_TD_CONC_BOTTLE_ERR	Total dissolvable (from unfiltered water) Th-230 concentration error	uBq/kg
Th_230_TD_CONC_BOTTLE_FLAG	quality flag: 1 = good; 2 = questionable; 3 = rejected	unitless
Th_232_D_CONC_BOTTLE	Dissolved ((<0.45 um) Th-232 concentration	pmol/kg
Th_232_D_CONC_BOTTLE_ERR	Dissolved ((<0.45 um) Th-232 concentration error	pmol/kg
Th_232_D_CONC_BOTTLE_FLAG	quality flag: 1 = good; 2 = questionable; 3 = rejected	unitless
Th_232_TD_CONC_BOTTLE	Total dissolvable (from unfiltered water) Th-232 concentration	pmol/kg

Th_232_TD_CONC_BOTTLE_ERR	Total dissolvable (from unfiltered water) Th-232 concentration error	pmol/kg
Th_232_TD_CONC_BOTTLE_FLAG	quality flag: 1 = good; 2 = questionable; 3 = rejected	unitless
Th_230_D_XS_CONC_BOTTLE	Dissolved (<0.45 um) Th-230 corrected for lithogenic source	uBq/kg
Th_230_D_XS_CONC_BOTTLE_ERR	Dissolved (<0.45 um) Th-230 corrected for lithogenic source error	uBq/kg
Th_230_D_XS_CONC_BOTTLE_ERR_FLAG	quality flag: 1 = good; 2 = questionable; 3 = rejected	unitless
date_U_separated	The date that uranium was chemically separated from thorium in the sample analysis; used in the ingrowth calculation	yyyymmdd

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Aerosol Sampler
Dataset-specific Description	Tisch Environmental PM10 aerosol sampler (TE-6070), using 20 cm x 25 cm Whatman41 filter sheets.
Generic Instrument Description	A device that collects a sample of aerosol (dry particles or liquid droplets) from the atmosphere.

Dataset-specific Instrument Name	
Generic Instrument Name	GO-FLO Bottle
Dataset-specific Description	5-L Go-Flo bottle, attached to the ship’s Kevlar line
Generic Instrument Description	GO-FLO bottle cast used to collect water samples for pigment, nutrient, plankton, etc. The GO-FLO sampling bottle is specially designed to avoid sample contamination at the surface, internal spring contamination, loss of sample on deck (internal seals), and exchange of water from different depths.

Dataset-specific Instrument Name	
Generic Instrument Name	Niskin bottle
Dataset-specific Description	ship’s CTD with conventional Niskin bottles
Generic Instrument Description	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.

Dataset-specific Instrument Name	
Generic Instrument Name	Trace element sampler
Dataset-specific Description	MITESS unit
Generic Instrument Description	Automated trace element sampler (MITESS or ATE unit). Bell, J., J. Betts, and E. Boyle (2002) MITESS: A Moored In-situ Trace Element Serial Sampler for Deep-Sea Moorings, Deep-Sea Research I: 49:2103-2118 (pdf) More description: http://boyle.mit.edu/~ed/MITESS/MITESShomepage.html

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Deployments

AE1410

Website	https://www.bco-dmo.org/deployment/638976
Platform	R/V Atlantic Explorer
Report	http://dmoserv3.bco-dmo.org/data_docs/GEOTRACES/AE1410/2014_ChfSci_Training_final_cruise_rpt.pdf
Start Date	2014-05-30
End Date	2014-06-12
Description	UNOLS Chief Scientist training cruise. The original data from this cruise are available from the NSF R2R data catalog.

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Project Information

Chief Scientist Training Cruise (Barbados-Bermuda, May 2014) (NSF Chief Sci Training Barbados-Bermuda)

NSF Award Abstract:
Overview:
This grant will support a CST cruise on the R/V Atlantic Explorer from Barbados to Bermuda in May and June 2014. Chief Scientist Training (CST) cruises are part of an educational initiative designed for young US oceanographers, from senior graduate students to junior faculty, to increase their participation in seagoing research by educating them about the capabilities and opportunities provided by the UNOLS research fleet. In addition to providing sampling opportunities for individual research, a CST cruise is specifically organized to teach cruise participants how to successfully plan and execute a research cruise, from proposal to post-cruise reporting. Cruise participants will be selected based on the feasibility of their proposed Intellectual Merit: The ship track covers a oceanographically important transitional area in the western subtropical Atlantic, and thus the participants will be able to obtain scientifically valuable data in addition to gaining valuable skills and training that will help them to plan and execute successful cruises in their future careers.

Broader Impacts:
The CST cruise will help develop future expertise in the US oceanographic community by reducing the barriers to participation of young scientists in seagoing research, particularly those scientists from non ship-operator institutions. The activities proposed will help to disseminate information about the research opportunities that are provided by NSF and the UNOLS research fleet. The training and workshop activities are projected to increase the number and breadth of future proposals requesting ship support as well as to improve the quality of execution and success of funded cruises. The CST cruise opportunity will also help to broaden the geographic representation of the research community that is involved in ship-based scientific studies as well as increase the diversity of this community.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1360666

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