

Particulate 210Po and 210Pb from R/V Knorr KN199-04, KN204-01 in the Subtropical northern Atlantic Ocean from 2010-2011 (U.S. GEOTRACES NAT project)

Website: <https://www.bco-dmo.org/dataset/3917>

Data Type: Cruise Results

Version: 2

Version Date: 2013-06-14

Project

» [U.S. GEOTRACES North Atlantic Transect \(GA03\)](#) (U.S. GEOTRACES NAT)

Program

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

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Abstract

Particulate 210Po and 210Pb from R/V Knorr KN199-04, KN204-01 in the Subtropical northern Atlantic Ocean from 2010-2011.

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Coverage

Spatial Extent: N:39.6994 E:-9.66 S:17.3503 W:-69.799

Temporal Extent: 2010-10-16 - 2011-12-09

Dataset Description

Version changes:

Version 14June2013: The depth for KN204-01 pump samples was updated from target (nominal) depths to depths based on the final, corrected, and most accurate pump depth. The KN199-04 depths remain as the target (nominal) depths. See the particle composition dataset (<https://www.bco-dmo.org/dataset/3871>) in the Sampling section for further details.

Methods & Sampling

Currently the recommended assay of both dissolved and particulate seawater samples are outlined in GEOTRACES procedures manual at:
<http://www.obs-vlfr.fr/GEOTRACES/science/intercalibration/222-sampling-and-sample-handling-protocols-for-geotraces-cruises>
It is also published in Baskaran, et al. (2013).

Data Processing Description

The calculated activities were corrected for in-growth, decay, chemical recoveries, filter and reagent blanks and detector background (all details are outlined by Baskaran et al. (2013) given above).

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Data Files

| File |
|---|
| PoPb_partic_joined_2b.csv (Comma Separated Values (.csv), 10.80 KB) MD5:b08eb705b29b7c411e38bc50e002fadf Primary data file for dataset ID 3917 |

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Related Publications

Baskaran, M., Church, T., Hong, G., Kumar, A., Qiang, M., Choi, H., ... Maiti, K. (2013). Effects of flow rates and composition of the filter, and decay/ingrowth correction factors involved with the determination of in situ particulate²¹⁰Po and²¹⁰Pb in seawater. *Limnology and Oceanography: Methods*, 11(3), 126–138.
doi:[10.4319/lom.2013.11.126](https://doi.org/10.4319/lom.2013.11.126)
Methods

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Parameters

| Parameter | Description | Units |
|----------------------|--|---|
| cruise_id | Official cruise identifier e.g. KN199-04 = R/V Knorr cruise number 199-04 | dimensionless |
| cruise_name | project designated cruise name | dimensionless |
| station_GEOTRC | GEOTRACES station number | dimensionless |
| depth | final depth of pump sample. For KN199-4: reported depth is the target depth from wire out. For KN204-1: reported depth is corrected depth using RBR data loggers. | meters |
| cast_GEOTRC | Cast identifier numbered consecutively within a station. Values were added from the intermediate US GEOTRACES master file (see Processing Description). | dimensionless |
| lat | latitude; North is positive | decimal degrees |
| lon | longitude; East is positive | decimal degrees |
| event_GEOTRC | Unique identifying number for US GEOTRACES sampling events; ranges from 2001 to 2225 for KN199-04 events and from 3001 to 3282 for KN204-01 events. Values were added from the intermediate US GEOTRACES master file (see Processing Description). | dimensionless |
| sample_GEOTRC | Unique identifying number for US GEOTRACES samples | dimensionless |
| sample_bottle_GEOTRC | Unique identification numbers given to samples taken from bottles; ranges from 1 to 24; often used synonymously with bottle number. Values were added from the intermediate US GEOTRACES master file (see Processing Description). | dimensionless |
| bottle_GEOTRC | Alphanumeric characters identifying bottle type (e.g. NIS representing Niskin and GF representing GOFLO) and position on a CTD rosette. Values were added from the intermediate US GEOTRACES master file (see Processing Description). | dimensionless |
| Po_210 | particulate Polonium-210 activity | dpm (nuclear decays per minute)/100 kilograms |
| Po_210_sd | particulate Polonium-210 activity error | dpm/100 kilograms |
| Pb_210 | particulate Lead-210 activity | dpm/100 kilograms |
| Pb_210_sd | particulate Lead-210 activity error | dpm/100 kilograms |
| Po_Pb_ratio | activity ratio of Polonium to Lead | dimensionless |
| Po_Pb_ratio_sd | activity ratio of Polonium to Lead error | dimensionless |
| BTL_ISO_DateTime_UTC | Date and time (UTC) variable recorded at the bottle sampling time in ISO compliant format. Values were added from the intermediate US GEOTRACES master file (see Processing Description). This standard is based on ISO 8601:2004(E) and takes on the following form: 2009-08-30T14:05:00[.xx]Z (UTC time) | yyyy-MM-dd'T'HH:mm:ss.SS'Z' |
| instr | instrument used for sample collection: McL-Prof = McLane Profiler; 30-ODF = Ocean Data Facility 12 bottle 30 liter Niskin rosette. | unitless |

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Instruments

| | |
|---|---|
| Dataset-specific Instrument Name | CTD Sea-Bird |
| Generic Instrument Name | CTD Sea-Bird |
| Dataset-specific Description | A self-recording Seabird 19plus CTD, deployed at the end of the line for both cruises. |
| Generic Instrument Description | Conductivity, Temperature, Depth (CTD) sensor package from SeaBird Electronics, no specific unit identified. This instrument designation is used when specific make and model are not known. See also other SeaBird instruments listed under CTD. More information from Sea-Bird Electronics. |

| | |
|---|---|
| Dataset-specific Instrument Name | McLane Pump |
| Generic Instrument Name | McLane Pump |
| Generic Instrument Description | McLane pumps sample large volumes of seawater at depth. They are attached to a wire and lowered to different depths in the ocean. As the water is pumped through the filter, particles suspended in the ocean are collected on the filters. The pumps are then retrieved and the contents of the filters are analyzed in a lab. |

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Deployments

KN199-04

| | |
|--------------------|---|
| Website | https://www.bco-dmo.org/deployment/58066 |
| Platform | R/V Knorr |
| Report | http://bcodata.whoi.edu/US_GEOTRACES/AtlanticSection/Cruise_Report_for_Knorr_199_Final_v3.pdf |
| Start Date | 2010-10-15 |
| End Date | 2010-11-04 |
| Description | <p>This cruise constitutes the first survey section as part of the U.S. participation in an international program named GEOTRACES. Funding: NSF OCE award 0926423 Science Objectives: To obtain state of the art trace metal and isotope measurements on a suite of samples taken on a mid-latitude zonal transect of the North Atlantic. In particular, sampling targeted the oxygen minimum zone extending off the west African coast near Mauritania, the TAG hydrothermal field, and the western boundary current system along Line W. For additional information, please refer to the GEOTRACES program Web site (https://www.geotraces.org/) for overall program objectives and a summary of properties measured. Science Activities include seawater sampling via GoFLO and Niskin carousels, in situ pumping (and filtration), CTDO2 and transmissometer sensors, underway pumped sampling of surface waters, and collection of aerosols and rain. Hydrography, CTD and nutrient measurements were supported by the Ocean Data Facility (J. Swift) at Scripps Institution of Oceanography and funded through NSF Facilities. They provided an additional CTD rosette system along with nephelometer and LADCP. A trace metal clean Go-Flo Rosette and winch were provided by the group at Old Dominion University (G. Cutter) along with a towed underway pumping system. Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/KN199-04 Other Relevant Links: List of cruise participants: [PDF] Cruise track: JPEG image (from Woods Hole Oceanographic Institution, vessel operator) ADCP data are available from the Currents ADCP group at the University of Hawaii: KN199-04 ADCP</p> |

KN204-01

| | |
|--------------------|--|
| Website | https://www.bco-dmo.org/deployment/58786 |
| Platform | R/V Knorr |
| Report | http://bcodata.whoi.edu/US_GEOTRACES/AtlanticSection/STS_Prelim_GT11_Doc.pdf |
| Start Date | 2011-11-06 |
| End Date | 2011-12-11 |
| Description | <p>The US GEOTRACES North Atlantic cruise aboard the R/V Knorr completed the section between Lisbon and Woods Hole that began in October 2010 but was rescheduled for November-December 2011. The R/V Knorr made a brief stop in Bermuda to exchange samples and personnel before continuing across the basin. Scientists disembarked in Praia, Cape Verde, on 11 December. The cruise was identified as KN204-01A (first part before Bermuda) and KN204-01B (after the Bermuda stop). However, the official deployment name for this cruise is KN204-01 and includes both part A and B. Science activities included: ODF 30 liter rosette CTD casts, ODU Trace metal rosette CTD casts, McLane particulate pump casts, underway sampling with towed fish and sampling from the shipboard "uncontaminated" flow-through system. Full depth stations are shown in the accompanying figure (see below). Additional stations to sample for selected trace metals to a depth of 1000 m are not shown. Standard stations are shown in red (as are the ports) and "super" stations, with extra casts to provide large-volume samples for selected parameters, are shown in green. Station spacing is concentrated along the western margin to evaluate the transport of trace elements and isotopes by western boundary currents. Stations across the gyre will allow scientists to examine trace element supply by Saharan dust, while also contrasting trace element and isotope distributions in the oligotrophic gyre with conditions near biologically productive ocean margins, both in the west, to be sampled now, and within the eastern boundary upwelling system off Mauritania, sampled last year. Funding: The cruise was funded by NSF OCE awards 0926204, 0926433 and 0926659. Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/KN204-01 Other Relevant Links: ADCP data are available from the Currents ADCP group at the University of Hawaii at the links below: KN204-01A (part 1 of 2011 cruise; Woods Hole, MA to Bermuda) KN204-01B (part 2 of 2011 cruise; Bermuda to Cape Verde)</p> |

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Project Information

U.S. GEOTRACES North Atlantic Transect (GA03) (U.S. GEOTRACES NAT)

Website: <https://www.geotraces.org/>

Coverage: Subtropical western and eastern North Atlantic Ocean (GA03)

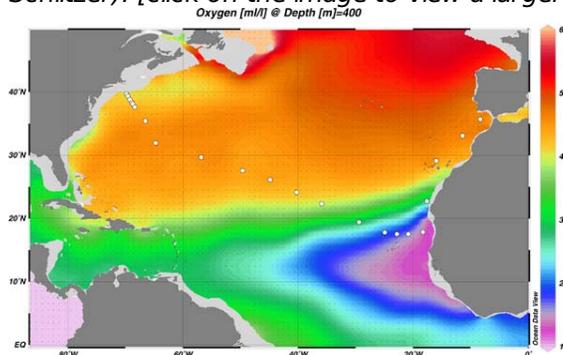
Much of this text appeared in an article published in OCB News, October 2008, by the OCB Project Office.

The first U.S. GEOTRACES Atlantic Section will be specifically centered around a sampling cruise to be carried out in the North Atlantic in 2010. Ed Boyle (MIT) and Bill Jenkins (WHOI) organized a three-day planning workshop that was held September 22-24, 2008 at the Woods Hole Oceanographic Institution. The main goal of the workshop, sponsored by the National Science Foundation and the U.S. GEOTRACES Scientific Steering Committee, was to design the implementation plan for the first U.S. GEOTRACES Atlantic Section. The primary cruise design motivation was to improve knowledge of the sources, sinks and internal cycling of Trace Elements and their Isotopes (TEIs) by studying their distributions along a section in the North Atlantic (Figure 1). The North Atlantic has the full suite of processes that affect TEIs, including strong meridional advection, boundary scavenging and source effects, aeolian deposition, and the salty Mediterranean Outflow. The North Atlantic is particularly important as it lies at the "origin" of the global Meridional Overturning Circulation.

It is well understood that many trace metals play important roles in biogeochemical processes and the carbon cycle, yet very little is known about their large-scale distributions and the regional scale processes that affect them. Recent advances in sampling and analytical techniques, along with advances in our understanding of their

roles in enzymatic and catalytic processes in the open ocean provide a natural opportunity to make substantial advances in our understanding of these important elements. Moreover, we are motivated by the prospect of global change and the need to understand the present and future workings of the ocean's biogeochemistry. The GEOTRACES strategy is to measure a broad suite of TEIs to constrain the critical biogeochemical processes that influence their distributions. In addition to these "exotic" substances, more traditional properties, including macronutrients (at micromolar and nanomolar levels), CTD, bio-optical parameters, and carbon system characteristics will be measured. The cruise starts at Line W, a repeat hydrographic section southeast of Cape Cod, extends to Bermuda and subsequently through the North Atlantic oligotrophic subtropical gyre, then transects into the African coast in the northern limb of the coastal upwelling region. From there, the cruise goes northward into the Mediterranean outflow. The station locations shown on the map are for the "fulldepth TEI" stations, and constitute approximately half of the stations to be ultimately occupied.

Figure 1. The proposed 2010 Atlantic GEOTRACES cruise track plotted on dissolved oxygen at 400 m depth. Data from the World Ocean Atlas (Levitus et al., 2005) were plotted using Ocean Data View (courtesy Reiner Schlitzer). [click on the image to view a larger version]

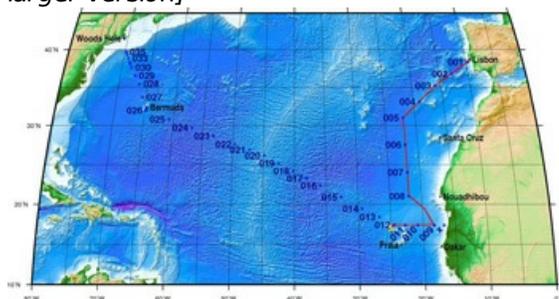


Hydrography, CTD and nutrient measurements will be supported by the Ocean Data Facility (J. Swift) at Scripps Institution of Oceanography and funded through NSF Facilities. They will be providing an additional CTD rosette system along with nephelometer and LADCP. A trace metal clean Go-Flo Rosette and winch system will be provided by the group at Old Dominion University (G. Cutter) along with a towed underway pumping system.

The North Atlantic Transect cruise began in 2010 with KN199 leg 4 (station sampling) and leg 5 (underway sampling only) (Figure 2).

[KN199-04 Cruise Report \(PDF\)](#)

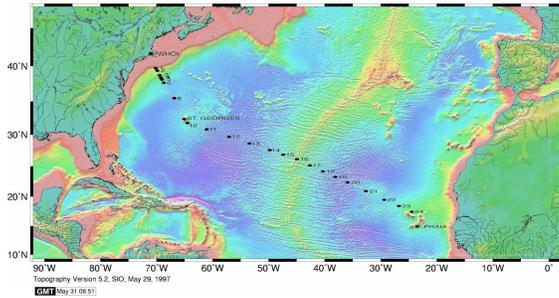
Figure 2. The red line shows the cruise track for the first leg of the US Geotraces North Atlantic Transect on the R/V Knorr in October 2010. The rest of the stations (beginning with 13) will be completed in October-December 2011 on the R/V Knorr (courtesy of Bill Jenkins, Chief Scientist, GNAT first leg). [click on the image to view a larger version]



The section completion effort resumed again in November 2011 with KN204-01A,B (Figure 3).

[KN204-01A,B Cruise Report \(PDF\)](#)

Figure 3. Station locations occupied on the US Geotraces North Atlantic Transect on the R/V Knorr in November 2011. [click on the image to view a larger version]



Data from the North Atlantic Transect cruises are available under the Datasets heading below, and consensus values for the SAFe and North Atlantic GEOTRACES Reference Seawater Samples are available from the GEOTRACES Program Office: [Standards and Reference Materials](#)

ADCP data are available from the Currents ADCP group at the University of Hawaii at the links below:

- [KN199-04](#) (leg 1 of 2010 cruise; Lisbon to Cape Verde)
- [KN199-05](#) (leg 2 of 2010 cruise; Cape Verde to Charleston, NC)
- [KN204-01A](#) (part 1 of 2011 cruise; Woods Hole, MA to Bermuda)
- [KN204-01B](#) (part 2 of 2011 cruise; Bermuda to Cape Verde)

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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.

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Funding

| Funding Source | Award |
|--|-----------------------------|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0961351 |

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