

# Dissolved rare earth element (REE) concentrations from the GEOTRACES North Atlantic Transect (Section GA03) collected on the R/V Knorr KN199-04, KN199-05, KN204-01 during 2010 (U.S. GEOTRACES NAT project)

**Website:** <https://www.bco-dmo.org/dataset/651138>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2016-07-06

## Project

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

» [Participation in October 2011 US GEOTRACES North Atlantic Zonal Section Continuation Cruise](#) (NAT\_Continue)

## Program

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

Contributors	Affiliation	Role
<a href="#">Shiller, Alan M.</a>	University of Southern Mississippi (USM)	Principal Investigator, Contact
<a href="#">Ake, Hannah</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager
<a href="#">Allison, Dicky</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

## Abstract

Dissolved rare earth element (REE) concentrations from the GEOTRACES North Atlantic Transect (Section GA03) collected on the R/V Knorr KN199-04, KN199-05, KN204-01 during 2010 (U.S. GEOTRACES NAT project)

---

## Table of Contents

- [Coverage](#)
  - [Dataset Description](#)
    - [Acquisition Description](#)
    - [Processing Description](#)
  - [Parameters](#)
  - [Instruments](#)
  - [Deployments](#)
  - [Project Information](#)
  - [Program Information](#)
  - [Funding](#)
- 

## Coverage

**Spatial Extent:** N:39.701 E:-9.66 S:16.855 W:-78.895

**Temporal Extent:** 2010-10-16 - 2010-11-02

---

## Dataset Description

Dissolved rare earth element concentrations comprised of 32 stations and additional surface water sampling across the North Atlantic Ocean, including NAT section GA03.

## Acquisition Description

Water column samples were taken from the GEOTRACES carousel and filtered through precleaned, 0.2 um Pall Acropak Supor filter capsules as described elsewhere (e.g., Cutter et al., 2012; Hatta et al., 2015). Near surface

water samples were collected using an underway towedfish pumped seawater system (Bruland et al., 2005) with samples filtered through sequential 0.45 µm Osmonics and 0.2 µm Polycarbonate (PCTE) cartridge filters. Filtered water was collected in 125 mL HDPE bottles (Nalgene) that had been pre-cleaned by soaking in hot 1.2 M HCl (reagent grade) for at least 8 h with subsequent thorough rinsing with ultrapure distilled deionized water (Barnstead E-pure). Samples were acidified in a laminar flow bench aboard ship using 0.5 mL of ultrapure HCl per 125 mL sample.

For analysis of dissolved rare earth elements (including Y), 14 mL of sample was spiked with a mixture of isotopically-enriched Nd-145, Sm-149, Eu-153, Gd-155, Dy-161, Er-167, and Yb-171 (Oak Ridge Nat'l. Labs). Each spike was greater than 90% enriched in the listed isotopes. The sample/spike ratio was chosen so as to have the analytical isotope ratios approximately the geometric mean of the natural and enriched spike isotope ratios. Samples were then extracted/pre-concentrated using a SeaFAST system (Elemental Scientific, Inc.) operated in offline mode. A similar online SeaFAST extraction procedure is described by Hawthorn et al., 2012. The extracted samples were subsequently analyzed using a Thermo-Fisher high resolution ICP-MS with an Apex-FAST high efficiency sample introduction system with Spiro desolvator (Elemental Scientific, Inc.).

The instrument was operated in low resolution. The enriched isotope spikes also served to provide counts/sec. calibration factors for elements that were not spiked with enriched isotopes. This calibration was also examined with a standard made in dilute nitric acid. Precision and recovery were checked by analysis of a large-volume composite North Atlantic surface seawater sample. Spiked (with a natural isotopic abundance elemental spike) and unspiked aliquots of this sample were analyzed twice in each analytical run. A Ba standard was also run to check for BaO<sup>+</sup> interference on several isotopes and Ba in the extracted samples was also monitored. Because the extraction resin in the SeaFAST system (Nobias PA-1) discriminates against Ba, plus the reduction of the BaO<sup>+</sup> interference by the desolvation system, BaO<sup>+</sup> was less than 0.1% of the counts in Eu-151, Eu-153, Gd-155, and Gd-157. Tests also revealed no significant low REE oxide interference on mid-/high-REEs.

## Processing Description

For more information on intercalibration procedures, refer to the dataset's [Intercalibration Report](#) (PDF).

**Additional GEOTRACES Processing:** After the data were submitted to the International Data Management Office, BODC, the office noticed that important identifying information was missing in many datasets.

A standardized BCO-DMO method (called "join") was then used to merge the missing parameters to each US GEOTRACES dataset, most often by matching on sample\_GEOTRC or on some unique combination of other parameters.

If the master parameters were included in the original data file and the values did not differ from the master file, the original data columns were retained and the name of the parameters were changed from the PI-submitted names to the standardized master names. If there were differences between the PI-supplied parameter values and those in the master file, both columns were retained. If the original data submission included all of the master parameters, no additional columns were added, but parameter names were modified to match the naming conventions of the master file.

*The GeoFish column in these data had no equivalent in the event master file, so no ISO\_DateTime values were added. The embargo on this dataset was removed on 17-Dec-2018.*

**See the dataset parameters documentation for a description of which parameters were supplied by the PI and which were added via the join method.**

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

## Parameters

Parameter	Description	Units
cruise_id	Cruise identification	unitless
cruise_name	Cruise name	unitless

station_GEOTRC	Station number	unitless
cast_GEOTRC	Cast number	unitless
GFISH_NO	GeoFish tow number	unitless
EVENT_LAT	Latitude at the start of the event; north is positive.	decimal degrees
EVENT_LON	Longitude at the start of the event; east is positive.	decimal degrees
CTDDEPTH	CTD bottle firing depth	meters
sample_GEOTRC	Unique GEOTRACES sample number	unitless
CTDPRS	CTD pressure	decibars
Y_D_CONC_BOTTLE	Dissolved Yttrium concentration from bottles	picomoles per kilogram
La_D_CONC_BOTTLE	Dissolved Lanthanum concentration from bottles	picomoles per kilogram
Ce_D_CONC_BOTTLE	Dissolved Cerium concentration from bottles	picomoles per kilogram
Pr_D_CONC_BOTTLE	Dissolved Praseodymium concentration from bottles	picomoles per kilogram
Nd_D_CONC_BOTTLE	Dissolved Neodymium concentration from bottles	picomoles per kilogram
Sm_D_CONC_BOTTLE	Dissolved Samarium concentration from bottles	picomoles per kilogram
Eu_D_CONC_BOTTLE	Dissolved Europium concentration from bottles	picomoles per kilogram
Gd_D_CONC_BOTTLE	Dissolved Gadolinium concentration from bottles	picomoles per kilogram
Tb_D_CONC_BOTTLE	Dissolved Terbium concentration from bottles	picomoles per kilogram
Dy_D_CONC_BOTTLE	Dissolved Dysprosium concentration from bottles	picomoles per kilogram
Ho_D_CONC_BOTTLE	Dissolved Holmium concentration from bottles	picomoles per kilogram
Er_D_CONC_BOTTLE	Dissolved Erbium concentration from bottles	picomoles per kilogram
Tm_D_CONC_BOTTLE	Dissolved Thulium concentration from bottles	picomoles per kilogram
Yb_D_CONC_BOTTLE	Dissolved Ytterbium concentration from bottles	picomoles per kilogram
Lu_D_CONC_BOTTLE	Dissolved Lutetium concentration from bottles	picomoles per kilogram
REE_FLAG	Data flags: 2 is probably good; 3 is probably bad. Because this group of elements are analyzed together with related calibration, only one data flag is given for the entire series.	unitless
Y_D_CONC_FISH	Dissolved Yttrium concentration from fish	picomoles per kilogram
La_D_CONC_FISH	Dissolved Lanthanum concentration from fish	picomoles per kilogram
Ce_D_CONC_FISH	Dissolved Cerium concentration from fish	picomoles per kilogram

Pr_D_CONC_FISH	Dissolved Praseodymium concentration from fish	picomoles per kilogram
Nd_D_CONC_FISH	Dissolved Neodymium concentration from fish	picomoles per kilogram
Sm_D_CONC_FISH	Dissolved Samarium concentration from fish	picomoles per kilogram
Eu_D_CONC_FISH	Dissolved Europium concentration from fish	picomoles per kilogram
Gd_D_CONC_FISH	Dissolved Gadolinium concentration from fish	picomoles per kilogram
Tb_D_CONC_FISH	Dissolved Terbium concentration from fish	picomoles per kilogram
Dy_D_CONC_FISH	Dissolved Dysprosium concentration from fish	picomoles per kilogram
Ho_D_CONC_FISH	Dissolved Holmium concentration from fish	picomoles per kilogram
Er_D_CONC_FISH	Dissolved Erbium concentration from fish	picomoles per kilogram
Tm_D_CONC_FISH	Dissolved Thulium concentration from fish	picomoles per kilogram
Yb_D_CONC_FISH	Dissolved Ytterbium concentration from fish	picomoles per kilogram
Lu_D_CONC_FISH	Dissolved Lutetium concentration from fish	picomoles per kilogram
BTL_ISO_DateTime_UTC	Date and time, formatted to the ISO 8601 standard, at the time of bottle firing. This variable was added when data were joined with the event_master.	YYYY-MM-DDTHH:MM:SS[.xx]Z

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

## Instruments

<b>Dataset-specific Instrument Name</b>	ICP-MS
<b>Generic Instrument Name</b>	Inductively Coupled Plasma Mass Spectrometer
<b>Dataset-specific Description</b>	The extracted samples were analyzed using a Thermo-Fisher high resolution ICP-MS with an Apex-FAST high efficiency sample introduction system with Spiro desolvator (Elemental Scientific, Inc.). The instrument was operated in low resolution.
<b>Generic Instrument Description</b>	An ICP Mass Spec is an instrument that passes nebulized samples into an inductively-coupled gas plasma (8-10000 K) where they are atomized and ionized. Ions of specific mass-to-charge ratios are quantified in a quadrupole mass spectrometer.

<b>Dataset-specific Instrument Name</b>	Bottle
<b>Generic Instrument Name</b>	GO-FLO Teflon Trace Metal Bottle
<b>Dataset-specific Description</b>	Filtered water was collected in 125 mL HDPE bottles (Nalgene) that had been precleaned by soaking in hot 1.2 M HCl (reagent grade) for at least 8 h with subsequent thorough rinsing with ultrapure distilled deionized water (Barnstead E-pure).
<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>	GeoFish
<b>Generic Instrument Name</b>	GeoFish Towed near-Surface Sampler
<b>Dataset-specific Description</b>	Near surface water samples were collected using an underway towedfish pumped seawater system (Bruland et al., 2005) with samples filtered through sequential 0.45 um Osmonics and 0.2 um Polycarbonate (PCTE) cartridge filters.
<b>Generic Instrument Description</b>	The GeoFish towed sampler is a custom designed near surface (

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

---

## Deployments

KN199-04

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58066">https://www.bco-dmo.org/deployment/58066</a>
<b>Platform</b>	R/V Knorr
<b>Report</b>	<a href="http://bcodata.whoi.edu/US_GEOTRACES/AtlanticSection/Cruise_Report_for_Knorr_199_Final_v3.pdf">http://bcodata.whoi.edu/US_GEOTRACES/AtlanticSection/Cruise_Report_for_Knorr_199_Final_v3.pdf</a>
<b>Start Date</b>	2010-10-15
<b>End Date</b>	2010-11-04
<b>Description</b>	<p>KN199-04 is the US GEOTRACES Zonal North Atlantic Survey Section cruise planned for late Fall 2010 from Lisboa, Portugal to Woods Hole, MA, USA. 4 November 2010 update: Due to engine failure, the scheduled science activities were canceled on 2 November 2010. On 4 November the R/V KNORR put in at Porto Grande, Cape Verde and is scheduled to depart November 8, under the direction of Acting Chief Scientist Oliver Wurl of Old Dominion University. The objective of this leg is to carry the vessel in transit to Charleston, SC while conducting science activities modified from the original plan. Planned scientific activities and operations area during this transit will be as follows: the ship's track will cross from the highly productive region off West Africa into the oligotrophic central subtropical gyre waters, then across the western boundary current (Gulf Stream), and into the productive coastal waters of North America. During this transit, underway surface sampling will be done using the towed fish for trace metals, nanomolar nutrients, and arsenic speciation. In addition, a port-side high volume pumping system will be used to acquire samples for radium isotopes. Finally, routine aerosol and rain sampling will be done for trace elements. This section will provide important information regarding atmospheric deposition, surface transport, and transformations of many trace elements. The vessel is scheduled to arrive at the port of Charleston, SC, on 26 November 2010. The original cruise was intended to be 55 days duration with arrival in Norfolk, VA on 5 December 2010. funding: NSF OCE award 0926423 Science Objectives are 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 will target 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. In addition, the major biogeochemical provinces of the subtropical North Atlantic will be characterized. For additional information, please refer to the GEOTRACES program Web site (GEOTRACES.org) for overall program objectives and a summary of properties to be 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 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 will be provided by the group at Old Dominion University (G. Cutter) along with a towed underway pumping system. List of cruise participants: [ PDF ] Cruise track: JPEG image (from Woods Hole Oceanographic Institution, vessel operator) Additional information may still be available from the vessel operator: WHOI cruise planning synopsis Cruise information and original data are available from the NSF R2R data catalog. ADCP data are available from the Currents ADCP group at the University of Hawaii: KN199-04 ADCP</p>

**KN199-05**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58142">https://www.bco-dmo.org/deployment/58142</a>
<b>Platform</b>	R/V Knorr
<b>Start Date</b>	2010-11-08
<b>End Date</b>	2010-11-26
<b>Description</b>	<p>KN199-05 is the completion of the US GEOTRACES Zonal North Atlantic Survey Section cruise originally planned for late Fall 2010 from Lisboa, Portugal to Woods Hole, MA, USA. 4 November 2010 update: Due to engine failure, the science activities scheduled for the KN199-04 cruise were canceled on 2 November 2010. On 4 November the R/V KNORR put in at Porto Grande, Cape Verde (ending KN199 leg 4) and is scheduled to depart November 8, under the direction of Acting Chief Scientist Oliver Wurl of Old Dominion University. The objective of KN199 leg 5 (KN199-05) is to carry the vessel in transit to Charleston, SC while conducting abbreviated science activities originally planned for KN199-04. The vessel is scheduled to arrive at the port of Charleston, SC, on 26 November 2010. The original cruise was intended to be 55 days duration with arrival in Norfolk, VA on 5 December 2010. Planned scientific activities and operations area during the KN199 leg 5 (KN199-05) transit will be as follows: the ship's track will cross from the highly productive region off West Africa into the oligotrophic central subtropical gyre waters, then across the western boundary current (Gulf Stream), and into the productive coastal waters of North America. During this transit, underway surface sampling will be done using the towed fish for trace metals, nanomolar nutrients, and arsenic speciation. In addition, a port-side high volume pumping system will be used to acquire samples for radium isotopes. Finally, routine aerosol and rain sampling will be done for trace elements. This section will provide important information regarding atmospheric deposition, surface transport, and transformations of many trace elements. Science Objectives are 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 will target 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. In addition, the major biogeochemical provinces of the subtropical North Atlantic will be characterized. For additional information, please refer to the GEOTRACES program Web site (GEOTRACES.org) for overall program objectives and a summary of properties to be 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 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 will be provided by the group at Old Dominion University (G. Cutter) along with a towed underway pumping system. List of cruise participants: [ PDF ] funding: NSF OCE award 0926423 WHOI cruise planning synopsis Cruise information and original data are available from the NSF R2R data catalog. ADCP data are available from the Currents ADCP group at the University of Hawaii: KN199-05 ADCP</p>

**KN204-01**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58786">https://www.bco-dmo.org/deployment/58786</a>
<b>Platform</b>	R/V Knorr
<b>Report</b>	<a href="http://bcodata.whoi.edu/US_GEOTRACES/AtlanticSection/STS_Prelim_GT11_Doc.pdf">http://bcodata.whoi.edu/US_GEOTRACES/AtlanticSection/STS_Prelim_GT11_Doc.pdf</a>
<b>Start Date</b>	2011-11-06
<b>End Date</b>	2011-12-11
<b>Description</b>	<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. The cruise was funded by NSF OCE awards 0926204, 0926433 and 0926659. Additional information may be available from the vessel operator site, URL: <a href="http://www.whoi.edu/cruiseplanning/synopsis.do?id=1662">http://www.whoi.edu/cruiseplanning/synopsis.do?id=1662</a>. Cruise information and original data are available from the NSF R2R data catalog. 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>

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

## Project Information

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

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

**Coverage:** Subtropical western and eastern North Atlantic Ocean

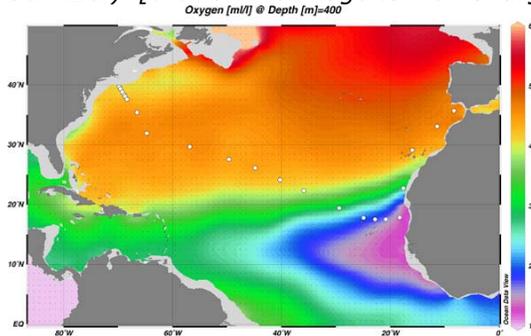
*Much of this text appeared in an article published in OCB News, October 2008, by the OCB Project Office.*

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]

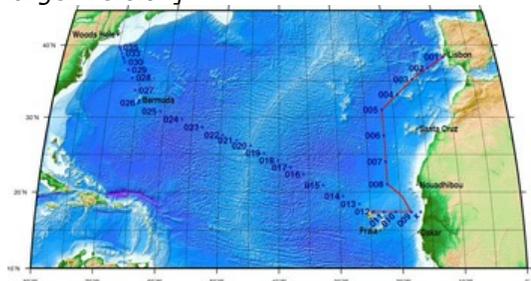


Hydrography, CTD and nutrient measurements will be supported by the Ocean Data Facility (J. Swift) at Scripps Institution of Oceanography and funded through NSF Facilities. They will be providing an additional CTD rosette system along with nephelometer and LADCP. A trace metal clean Go-Flo Rosette and winch 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 \(PDF\)](#)

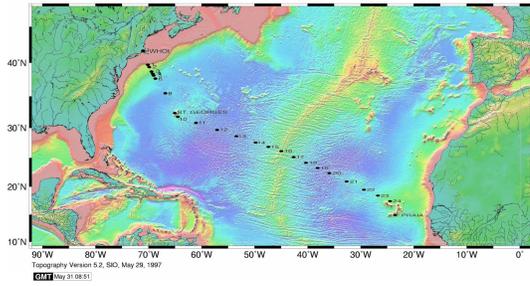
Figure 2. The red line shows the cruise track for the first leg of the US Geotraces North Atlantic Transect on the R/V Knorr in October 2010. The rest of the stations (beginning with 13) will be completed in October-December 2011 on the R/V Knorr (courtesy of Bill Jenkins, Chief Scientist, GNAT first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

### **Participation in October 2011 US GEOTRACES North Atlantic Zonal Section Continuation Cruise (NAT\_Continue)**

**Coverage:** North Atlantic: Lisbon to Cape Verde Is. (2010) and Woods Hole to Bermuda to Cape Verde Is. (2011).

The U.S. GEOTRACES North Atlantic zonal section cruise was scheduled for 15 October through 5 December 2010. Because of a major irresolvable mechanical failure of the ship's propulsion system, the expedition had to be terminated in the Cape Verde Islands on 4 November after completing about one third of the planned track. This required on-the-spot changes in return travel for all sea-going investigators as well as in shipping arrangements for all their samples and equipment. The funds requested in this proposal address the PI's need to cover a graduate student and purchase supplies associated with his participation in the continuation of the North Atlantic section cruise scheduled for autumn 2011. The additional funds for the graduate student would cover the effort to prepare for a second cruise whereas the supply request is to replace those lost during the first cruise. The proposed research would significantly improve our knowledge of cross margin exchange of trace elements, as well as the impact of atmospheric inputs on ocean chemistry. (From award abstract)

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

---

## **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](#) ]

---

## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0927951</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1137851</a>

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