Concentrations of dissolved iron and manganese determined in water-column and near-surface seawater samples collected on the US GEOTRACES GP17-OCE cruise on R/V Roger Revelle (RR2214) in the South Pacific and Southern Oceans from Dec 2022 to Jan 2023

Website: https://www.bco-dmo.org/dataset/986862
Data Type: Cruise Results
Version: 1
Version Date: 2025-12-05

Project
» US GEOTRACES GP17 Section: South Pacific and Southern Ocean (GP17-OCE) (GP17-OCE)
» Collaborative Research: US GEOTRACES GP17-OCE: Shipboard Measurements of Dissolved Aluminum, Iron, and Manganese – Tracing Inputs to the South Pacific Gyre and Southern Ocean (GP17-OCE DFe DMn DAl)

Program
» U.S. GEOTRACES (U.S. GEOTRACES)

Contributors	Affiliation	Role
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Abstract
These data comprise the concentrations of dissolved iron and manganese determined in water-column and near-surface seawater samples, collected using a trace-metal clean CTD rosette or underway towfish sampler, respectively, during U.S. GEOTRACES cruise GP17-OCE (R/V Roger Revelle cruise RR2214). The dissolved iron data include shipboard measurements made using flow-injection analysis, and post-cruise measurements made using inductively-coupled plasma mass spectrometry, whereas the dissolved manganese data include only post-cruise measurements made using inductively-coupled plasma mass spectrometry.

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Coverage

Location: Southeastern Pacific Subtropical Gyre to Southeastern Pacific sector of Southern Ocean
Spatial Extent: **N**:-20 **E**:-75.1 **S**:-67.01 **W**:-152
Temporal Extent: 2021-12-21 - 2023-01-24

Methods & Sampling

Water-column samples for trace metal analysis were collected in modified 12-liter (L) Teflon-lined GoFlo samplers (General Oceanics Inc.) deployed on the U.S. GEOTRACES clean CTD rosette system with a total of 24 samplers. All samples were filtered as soon as possible after recovery by GEOTRACES sampling personnel using a pre-cleaned, sample-rinsed 0.2-micrometer (µm) Supor Acropak filter cartridge (Pall Corp.) inside the U.S. GEOTRACES clean-air laboratory van. Near-surface seawater samples (~2 meters depth) were collected while underway near each station using a towed fish sampling system towed outside of the ship's wake; using a pneumatic Teflon bellows pump, seawater from the towed fish was pumped into a clean-air 'bubble' in the ship's laboratory, where it was filtered through a pre-cleaned, sample-rinsed 0.2 µm Supor Acropak filter cartridge. The sample collection, filtration, and subsampling followed established GEOTRACES protocols. The filtered seawater samples for post-cruise analysis of dissolved iron and maganese were collected in 125-milliliter (mL) acid-cleaned Nalgene wide-mouth low-density polyethylene (LDPE) bottles, and acidified at-sea to pH ~1.7 using Fisher Optima grade ultrapure hydrochloric acid diluted to ~6N using ultrapure deionized water (Barnstead Nanopure). These acidified samples were stored at room temperature for several months prior to analysis at Old Dominion University. Samples that were used for shipboard dissolved iron analysis were similarly collected in 125 mL acid-cleaned LDPE bottles and acidified to pH ~1.7 for at least 12 hours prior to analysis. For the samples used for shipboard analysis, several sets of LDPE bottles were repeatedly re-used; after use, these bottles were emptied, rinsed with ultrapure deionized water, filled with dilute ultrapure hydrochloric acid and stored for at least 12 hours, and then rinsed with ultrapure deionized water before rinsing and filling with new seawater samples.

Shipboard dissolved iron (DFe) determinations used flow-injection analysis (FIA) with colorimetric detection after in-line preconcentration on resin-immobilized 8-hydroxyquinoline (Sedwick et al., 2005; 2015), modified from the method of Measures et al. (1995). Analyses were performed on a volumetric basis, so the DFe concentrations are reported in units of nanomole per liter (nM). Analytical precision and accuracy were monitored via the analysis of in-house reference seawater samples during each day of shipboard measurements, whereas seawater consensus reference materials were analyzed only on selected days, due to limited available volumes. Repeat, separate-day analyses of an in-house reference seawater sample yielded a mean DFe concentration of 0.294 ± 0.038 nM (one sigma, n = 9). These measurements yield an estimated overall analytical uncertainty of ±12.9%, expressed as one relative standard deviation on the mean, and a detection limit of 0.11 nM DFe, estimated from three times the standard deviation on the mean. All samples were analyzed at least twice (at two separate times of the day) during each analysis. Analyses of seawater consensus reference material SAFe D2 #294 yielded a mean concentration of 1.03 ± 0.05 nM (one-sigma, n = 2), which compares favorably to the consensus value of 0.91 ± 0.022 nM DFe. In addition, analysis of GEOTRACES seawater consensus reference material GSP #113 yielded a mean concentration of 1.42 nM, which is much greater than the consensus value of 0.155 nM DFe; because this sample bottle had been opened multiple times over several years and had only a small volume remaining, it was likely contaminated with iron prior to shipboard analysis.

Post-cruise determinations of dissolved iron (DFe) and dissolved manganese (DMn) were made using inductively-coupled plasma mass spectrometry (ICP-MS, Thermo Fisher Scientific ElementXR) with in-line separation-preconcentration (Elemental Scientific SeaFAST SP3), modified after the method of Lagerström et al. (2013). Calibration standards were prepared in low-analyte concentration filtered seawater for which initial concentrations were determined using the method of standard additions (Sedwick et al., 2022). Calibration standards were introduced using the same in-line separation-preconcentration procedure as the seawater filtrate samples, with indium used as an internal standard. Analytical blank concentrations were assessed by applying the in-line separation-preconcentration procedure, including all reagents and loading air in place of the seawater filtrate sample ("air blank"), yielding mean blank concentrations of 0.000 ± 0.005 nM for DFe (n = 8), and 0.004 ± 0.001 nM for DMn (n = 14). Analytical limits of detection, defined as the concentrations equivalent to three times the standard deviation on the mean blank, were 0.016 nM DFe and 0.003 nM for DMn. Mean concentrations of multiple, separate-day determinations of GEOTRACES sample number 15704 seawater collected during the GP15 cruise were 0.11 ± 0.03 nM DFe (n = 21) and 0.83 ± 0.03 nM DMn (n = 23). Previous analyses of this in-house reference seawater using ICP-MS had yielded mean concentrations of 0.16 ± 0.02 nM DFe (n = 7) and 0.82 ± 0.03 nM DMn (n = 9) while analyzed alongside seawater consensus reference materials GSP and SAFe D2 that yielded mean concentrations of 0.0115 ± 0.01 nM and 0.968 ± 0.007 nM DFe, and 0.786 ± 0.011 nM and 0.468 ± 0.004 nM DMn, respectively (consensus concentrations for the GSP and SAFe D2 seawater are 0.155 ± 0.045 nM and 0.956 ± 0.024 nM DFe, and 0.778 ± 0.034 nM and 0.36 ± 0.05 nM DMn, respectively). Analytical precision at the concentration levels of the in-house reference seawater, expressed as ± one relative standard deviation on the mean, are ± 32% for DFe (noting the relatively low concentration of the in-house reference water) and ± 3.1% for DMn. In addition, the typical reproducibility of repeat sample analyses during a single analytical run were ± 8.0% for DFe and ± 3.6% for DMn.

Data Processing Description

Inductively-coupled plasma mass spectrometry analysis:
Instrumental data were collected using ElementXR processing software (Thermo Fisher Scientific), and post-analysis calculations were performed using Microsoft Excel.

Flow injection analysis:
Sample concentrations were calculated from absorbance peak areas (after subtraction of zero-loading blank values) using least-squares linear regressions fit to daily calibration curves obtained by additions of iron standard solutions to low-iron seawater.

Data quality flags:
1 = good;
2 = likely contaminated/questionable;
3 = GoFlo mistrip/did not close/not sampled;
4 = not determined (ND);
5 = only one measurement; no standard deviation.

BCO-DMO Curation Notes

- Imported original file "Sedwick_GP17-OCE_DFe&DMn_BCO-DMO_Final.xlsx" into the BCO-DMO system.
- Marked "NAN", "ND", and "-999.0" as missing data values (missing data are empty/blank in the final CSV file).
- Converted date format to YYYY-MM-DD.
- Renamed fields to comply with BCO-DMO naming conventions.
- Saved the final file as "986862_v1_gp17-oce_dissolved_fe_mn.csv".

Problem Description

Shipboard iron analyses of the first two stations show unusually high concentrations. This was likely due to residual contamination in the flow-injection system. This issue was evident from comparison to in-house reference seawater, which also showed higher concentrations than obtained from pre-cruise analyses.

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Data Files

File	
986862_v1_gp17-oce_dissolved_fe_mn.csv	(Comma Separated Values (.csv), 49.91 KB) MD5:9a6de4b0ac8d5bc39dacc8885150706d
Primary data file for dataset ID 986862, version 1	

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Related Publications

Lagerström, M. E., Field, M. P., Séguret, M., Fischer, L., Hann, S., & Sherrell, R. M. (2013). Automated on-line flow-injection ICP-MS determination of trace metals (Mn, Fe, Co, Ni, Cu and Zn) in open ocean seawater: Application to the GEOTRACES program. Marine Chemistry, 155, 71–80. doi:10.1016/j.marchem.2013.06.001
Methods

Sedwick, P. ., Sohst, B. M., Ussher, S. J., & Bowie, A. R. (2015). A zonal picture of the water column distribution of dissolved iron(II) during the U.S. GEOTRACES North Atlantic transect cruise (GEOTRACES GA03). Deep Sea Research Part II: Topical Studies in Oceanography, 116, 166–175. doi:10.1016/j.dsr2.2014.11.004
Methods

Sedwick, P. N., Church, T. M., Bowie, A. R., Marsay, C. M., Ussher, S. J., Achilles, K. M., Lethaby, P. J., Johnson, R. J., Sarin, M. M., & McGillicuddy, D. J. (2005). Iron in the Sargasso Sea (Bermuda Atlantic Time-series Study region) during summer: Eolian imprint, spatiotemporal variability, and ecological implications. Global Biogeochemical Cycles, 19(4). Portico. https://doi.org/10.1029/2004gb002445 https://doi.org/10.1029/2004GB002445
Methods

Sedwick, P. N., Sohst, B. M., O'Hara, C., Stammerjohn, S. E., Loose, B., Dinniman, M. S., Buck, N. J., Resing, J. A., & Ackley, S. F. (2022). Seasonal Dynamics of Dissolved Iron on the Antarctic Continental Shelf: Late-Fall Observations From the Terra Nova Bay and Ross Ice Shelf Polynyas. Journal of Geophysical Research: Oceans, 127(10). Portico. https://doi.org/10.1029/2022jc018999 https://doi.org/10.1029/2022JC018999
Methods

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Parameters

Parameter	Description	Units
Station	cruise station identifier	unitless
GEOTRACES_Sample_ID	Unique identifier for each water-column sample	unitless
Date	hydrocast recovery/towfish sampling date (UTC)	unitless
Lat_N	latitude of hydrocast station/towfish sample collection (nominal)	decimal degrees North
Long_E	longitude of hydrocast station/towfish sample collection (nominal)	decimal degrees East
Seafloor_Depth_m	seafloor depth of hydrocast station	meters (m)
Sample_P_dbar	in-situ pressure from CTD	decibar
Sample_Depth_m	sample collection depth estimated from Sample P (2 m is assumed for all towfish samples)	meters (m)
DFe_FIA_nM	dissolved iron (<0.2 µm) concentration measured shipboard by flow-injection analysis	nanomole per liter
SD_DFe_FIA_nM	standard deviation on repeated measurements of DFe-FIA (nM) made during a single analysis	nanomole per liter
DFe_FIA_Flag	Data quality flag that applies to DFe-FIA (nM): 1= good, 2= likely contaminated/questionable, 3 = GoFlo mistrip/did not close/not sampled, 4 = not determined, 5 = single measurement, no standard deviation.	unitless

DFe_ICP_nM	dissolved iron (<0.2 µm) concentration measured post-cruise by inductively-coupled plasma mass spectrometry. These data have been registered in the GEOTRACES DOoR portal as: Fe_D_CONC_BOTTLE::bcsp47 and Fe_D_CONC_FISH::wdqy0m.	nanomole per liter
SD_DFe_ICP_nM	standard deviation on repeated measurements of DFe-ICP (nM) made during a single analysis	nanomole per liter
DFe_ICP_Flag	Data quality flag that applies to DFe-ICP (nM): 1= good, 2= likely contaminated/questionable, 3 = GoFlo mistrip/did not close/not sampled, 4 = not determined, 5 = single measurement, no standard deviation.	unitless
DMn_ICP_nM	dissolved manganese (<0.2 µm) concentration measured post-cruise by inductively-coupled plasma mass spectrometry. These data have been registered in the GEOTRACES DOoR portal as: Mn_D_CONC_BOTTLE::cpfwmh and Mn_D_CONC_FISH::ps1fjy.	nanomole per liter
SD_DMn_ICP_nM	standard deviation on repeated measurements of DMn-ICP (nM) made during a single analysis	nanomole per liter
DMn_ICP_Flag	Data quality flag that applies to DMn-ICP (nM): 1= good, 2= likely contaminated/questionable, 3 = GoFlo mistrip/did not close/not sampled, 4 = not determined, 5 = single measurement, no standard deviation.	unitless

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Instruments

Dataset-specific Instrument Name	12 L Teflon-lined GoFlo samplers
Generic Instrument Name	GO-FLO Teflon Trace Metal Bottle
Dataset-specific Description	Water-column samples for trace metal analysis were collected in modified 12 L Teflon-lined GoFlo samplers (General Oceanics Inc.) deployed on the U.S. GEOTRACES clean CTD rosette system with a total of 24 samplers
Generic Instrument Description	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.

Dataset-specific Instrument Name	SeaFAST SP3
Generic Instrument Name	SeaFAST Automated Preconcentration System
Dataset-specific Description	Inductively-coupled plasma mass spectrometry analysis: ElementXR (Thermo Fisher Scientific) with SeaFAST SP3 in-line separation-preconcentration system and autosampler (Elemental Scientific).
Generic Instrument Description	The seaFAST is an automated sample introduction system for analysis of seawater and other high matrix samples for analyses by ICPMS (Inductively Coupled Plasma Mass Spectrometry).

Dataset-specific Instrument Name	SPD-20AV UV-visible detector
Generic Instrument Name	Spectrophotometer
Dataset-specific Description	Colorimetric detector for flow-injection analysis: SPD-20AV UV-visible detector (Shimadzu)
Generic Instrument Description	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.

Dataset-specific Instrument Name	ElementXR (Thermo Fisher Scientific)
Generic Instrument Name	Thermo Scientific ELEMENT XR high resolution inductively coupled plasma mass spectrometer
Dataset-specific Description	Inductively-coupled plasma mass spectrometry analysis: ElementXR (Thermo Fisher Scientific) with SeaFAST SP3 in-line separation-preconcentration system and autosampler (Elemental Scientific).
Generic Instrument Description	A high-resolution (HR) inductively coupled plasma (ICP) mass spectrometer (MS) composed of a dual mode secondary electron multiplier (SEM) and a Faraday detector. The ELEMENT XR instrument has a dynamic range of 5 x 10^7 to 1 x 10^12 counts per second (cps), and allows simultaneous measurement of elements at concentrations over 1000 ug/g.

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Deployments

RR2214

Website	https://www.bco-dmo.org/deployment/905754
Platform	R/V Roger Revelle
Report	https://www.bodc.ac.uk/resources/inventories/cruise_inventory/reports/rogerrevelle_rr2214.pdf
Start Date	2022-12-01
End Date	2023-01-25
Description	The U.S. GEOTRACES GP17-OCE expedition departed Papeete, Tahiti (French Polynesia) on December 1st, 2022 and arrived in Punta Arenas, Chile on January 25th, 2023. The cruise took place in the South Pacific and Southern Oceans aboard the R/V Roger Revelle with a team of 34 scientists led by Ben Twining (Chief Scientist), Jessica Fitzsimmons, and Greg Cutter (Co-Chief Scientists). GP17 was planned as a two-leg expedition, with its first leg (GP17-OCE) as a southward extension of the 2018 GP15 Alaska-Tahiti expedition and a second leg (GP17-ANT; December 2023-January 2024) into coastal and shelf waters of Antarctica's Amundsen Sea. The GP17-OCE section encompassed three major transects: (1) a southbound pseudo-meridional section (~152-135 degrees West) from 20 degrees South to 67 degrees South; (2) an eastbound zonal transect from 135 degrees West to 100 degrees West; (3) and a northbound section returning to Chile (100-75 degrees West). Additional cruise information is available from the following sources: R2R: https://www.rvdata.us/search/cruise/RR2214 CCHDO: https://cchdo.ucsd.edu/cruise/33RR20221201 More information can also be found at: https://usgeotraces.ldeo.columbia.edu/content/gp17-oce

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Project Information

US GEOTRACES GP17 Section: South Pacific and Southern Ocean (GP17-OCE) (GP17-OCE)

Website: http://www.geotraces.org/

Coverage: Papeete, Tahiti to Punta Arenas, Chile

The U.S. GEOTRACES GP17-OCE expedition departed Papeete, Tahiti (French Polynesia) on December 1st, 2022 and arrived in Punta Arenas, Chile on January 25th, 2023. The cruise took place in the South Pacific and Southern Oceans aboard the R/V Roger Revelle (cruise ID RR2214) with a team of 34 scientists lead by Ben Twining (Chief Scientist), Jessica Fitzsimmons and Greg Cutter (Co-Chief Scientists). GP17 was planned as a two-leg expedition, with its first leg (GP17-OCE) as a southward extension of the 2018 GP15 Alaska-Tahiti expedition and a second leg (GP17-ANT; December 2023-January 2024) into coastal and shelf waters of Antarctica's Amundsen Sea.

The South Pacific and Southern Oceans sampled by GP17-OCE play critical roles in global water mass circulation and associated global transfer of heat, carbon, and nutrients. Specific oceanographic regions of interest for GP17-OCE included: the most oligotrophic gyre in the global ocean, the Antarctic Circumpolar Current (ACC) frontal region, the previously unexplored Pacific- Antarctic Ridge, the Pacific Deep Water (PDW) flow along the continental slope of South America, and the continental margin inputs potentially emanating from South America.

Further information is available on the US GEOTRACES website and in the cruise report (PDF).

NSF Project Title: Collaborative Research: Management and Implementation of US GEOTRACES GP17 Section: South Pacific and Southern Ocean (GP17-OCE)

NSF Award Abstract:
This award will support the management and implementation of a research expedition from Tahiti to Chile that will enable sampling for a broad suite of trace elements and isotopes (TEI) across oceanographic regions of importance to global nutrient and carbon cycling as part of the U.S. GEOTRACES program. GEOTRACES is a global effort in the field of Chemical Oceanography, the goal of which is to understand the distributions of trace elements and their isotopes in the ocean. Determining the distributions of these elements and isotopes will

increase understanding of processes that shape their distributions, such as ocean currents and material fluxes, and also the processes that depend on these elements, such as the growth of phytoplankton and the support of ocean ecosystems. The proposed cruise will cross the South Pacific Gyre, the Antarctic Circumpolar Current, iron-limited Antarctic waters, and the Chilean margin. In combination with a proposed companion GEOTRACES expedition on a research icebreaker (GP17-ANT) that will be joined by two overlapping stations, the team of investigators will create an ocean section from the ocean's most nutrient-poor waters to its highly-productive Antarctic polar region - a region that plays an outsized role in modulating the global carbon cycle. The expedition will support and provide management infrastructure for additional participating science projects focused on measuring specific external fluxes and internal cycling of TEIs along this section.

The South Pacific Gyre and Pacific sector of the Southern Ocean play critical roles in global water mass circulation and associated global transfer of heat, carbon, and nutrients, but they are chronically understudied for TEIs due to their remote locale. These are regions of strong, dynamic fronts where sub-surface water masses upwell and subduct, and biological and chemical processes in these zones determine nutrient stoichiometries and tracer concentrations in waters exported to lower latitudes. The Pacific sector represents an end member of extremely low external TEI surface fluxes and thus an important region to constrain inputs from the rapidly-changing Antarctic continent. Compared to other ocean basins, TEI cycling in these regions is thought to be dominated by internal cycling processes such as biological uptake, regeneration, and scavenging, and these are poorly represented in global ocean models. The cruise will enable funded investigators to address research questions such as: 1) what are relative rates of external TEI fluxes to this region, including dust, sediment, hydrothermal, and cryospheric fluxes? 2) What are the (micro) nutrient regimes that support productivity, and what impacts do biomass accumulation, export, and regeneration have on TEI cycling and stoichiometries of exported material? 3) What are TEI and nutrient stoichiometries of subducting water masses, and how do scavenging and regeneration impact these during transport northward? This management project has several objectives: 1) plan and coordinate a 55-day research cruise in 2021-2022; 2) use both conventional and trace-metal 'clean' sampling systems to obtain TEI samples, as well as facilitate sampling for atmospheric aerosols and large volume particles and radionuclides; 3) acquire hydrographic data and samples for salinity, dissolved oxygen, algal pigments, and macro-nutrients; and deliver these data to relevant repositories; 4) ensure that proper QA/QC protocols, as well as GEOTRACES intercalibration protocols, are followed and reported; 5) prepare the final cruise report to be posted with data; 6) coordinate between all funded cruise investigators, as well as with leaders of proposed GP17-ANT cruise; and 7) conduct broader impact efforts that will engage the public in oceanographic research using immersive technology. The motivations for and at-sea challenges of this work will be communicated to the general public through creation of immersive 360/Virtual Reality experiences, via a collaboration with the Texas A&M University Visualization LIVE Lab. Through Virtual Reality, users will experience firsthand what life and TEI data collection at sea entail. Virtual reality/digital games and 360° experiences will be distributed through GEOTRACES outreach websites, through PI engagement with local schools, libraries, STEM summer camps, and adult service organizations, and through a collaboration with the National Academy of Sciences.

Collaborative Research: US GEOTRACES GP17-OCE: Shipboard Measurements of Dissolved Aluminum, Iron, and Manganese – Tracing Inputs to the South Pacific Gyre and Southern Ocean (GP17-OCE DFe DMn DAl)

Coverage: Southeast Pacific Ocean and Eastern Pacific Sector of Southern Ocean

NSF Award Abstract:

The goal of the international research program GEOTRACES is to understand the distributions of trace chemical elements and their isotopes in the oceans. The importance of trace elements in the ocean lies in their roles as essential micronutrients for marine phytoplankton (e.g., iron), as toxicants (e.g., lead), and as tracers of past and present oceanic processes (e.g., thorium). In this project, the dissolved concentrations of two micronutrient trace elements (iron and manganese) and a tracer of atmospheric dust deposition (aluminum) will be measured in seawater samples collected during a research cruise in the southeastern Pacific Ocean and adjacent Southern Ocean, in order to better understand the inputs of these micronutrients and their impact on biological processes in these regions. Chemical analyses will be performed at sea in near real-time, thus providing a first glimpse of data that will inform the cruise sampling strategy and the analyses performed by other investigators. The project involves two US laboratories, and will support the research of a graduate and undergraduate student.

The U.S. GEOTRACES GP17-OCE expedition will focus on the distribution of trace elements and isotopes along a transect crossing the South Pacific Gyre and the Pacific sector of the Southern Ocean, where the supply of dissolved iron (DFe) and manganese (DMn) to the surface ocean is thought to regulate primary production and associated cycling of carbon and nutrient elements. The investigators will undertake shipboard and post-cruise measurements of dissolved aluminum (DAl), DFe and DMn in order to constrain (1) the magnitude of dust deposition to this ocean region and the fidelity of DAl and DMn as tracers of aeolian iron inputs; (2) the origin of deep-ocean DAl and DFe anomalies, and their implications for deep sources of these elements; and (3) the source and fate of hydrothermal DFe emissions from the deep ocean and their role in supporting Southern Ocean primary production. Project results, complemented by measurements of other trace chemical species made by collaborators on GP17-OCE, will advance the understanding of the processes that control the oceanic inventories and distributions of DAl, DFe and DMn, and their trajectories of future change.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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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-2123623
NSF Division of Ocean Sciences (NSF OCE)	OCE-2122886

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