Profiles of dissolved trace elements collected using a trace-metal clean rosette from surface to 1000m depth from two CLIVAR P16 cruises in 2005 and 2006

Website: https://www.bco-dmo.org/dataset/778403
Data Type: Cruise Results
Version: 1
Version Date: 2019-10-02

Project
» Collaborative Research: Global Ocean Survey of Dissolved Iron and Aluminum and Aerosol Iron and Aluminum Solubility Supporting the Repeat Hydrography (CO2) Project (CLIVAR AEROSOL)

Program
» U. S. Climate Variability and Predictability (U.S. CLIVAR)

Contributors	Affiliation	Role
Landing, William M.	Florida State University EOAS (FSU - EOAS)	Principal Investigator, Contact
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Abstract
Profiles of dissolved trace elements collected using a trace-metal clean rosette from surface to 1000m depth from two CLIVAR P16 cruises in 2005 and 2006.

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Coverage

Spatial Extent: **N**:55.7699 **E**:-149.931 **S**:-70.9996 **W**:-153
Temporal Extent: 2005-01-10 - 2006-03-29

Dataset Description

Profiles of dissolved trace elements collected using a trace-metal clean rosette from surface to 1000m depth.

Methods & Sampling

Please see the related methods papers for all methodology details (Measures et al., 2008 and Milne et al., 2010).

In brief, samples were collected using a rosette system, described in Measures et al. (2008), comprised of a Seabird SBE 911+ CTD, SBE 443 dissolved oxygen sensor, Wet Labs FL 1 fluorometer, and 12-L Teflon coated GO-FLO bottles. See Measures et al. (2008) for sampling procedures/protocols.

Milne et al. (2010) describes the methods used for the simultaneous determination of eight trace metals (Mn, Fe, Co, Ni, Cu, Zn, Cd, Pb) in seawater using the commercially available Toyopearl AF-Chelate-650M chelating resin. Isotope dilution (ID) was employed for the determination of Fe, Ni, Cu, Zn, Cd and Pb whereas the method of standard addition was used for the mono-isotopic elements Mn and Co. The method was verified through the analysis of certified reference material (NASS-5) and the SAFe inter-comparison samples (S1 and D2).

Data Processing Description

Missing data are coded -999. This occurs when the ICPMS data for an extracted sample is unreliable. All data reduction was done using Excel.

The WHP flag code scheme was used with this data set. The WHP bottle parameter data quality codes are:
1 = Sample for this measurement was drawn from water bottle but analysis not received. Note that if water is drawn for any measurement from a water bottle, the quality flag for that parameter must be set equal to 1 initially to ensure that all water samples are accounted for.
2 = Acceptable measurement.
3 = Questionable measurement.
4 = Bad measurement.
5 = Not reported.
6 = Mean of replicate measurements (Number of replicates should be specified in the -.DOC file and replicate data tabulated).
7 = Manual chromatographic peak measurement.
8 = Irregular digital chromatographic peak integration.
9 = Sample not drawn for this measurement from this bottle.

BCO-DMO Processing:
- formatted TIME column to HHMM;
- replaced "<LOD" with "BDL";
- filled empty cells with "nd";
- made corrections to EXPOCODE numbers: changed P16N_3250TT192 to P16N_3250TT191 and "33RR20050" to "33RR200501";
- added date/time field in ISO8601 format using the original DATE and TIME fields provided.

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Data Files

File	
P16_trace_metal_profiles.csv	(Comma Separated Values (.csv), 196.04 KB) MD5:c64940f84097c62a17b6225c81a03aec
Primary data file for dataset ID 778403	

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Related Publications

Measures, C. I., Landing, W. M., Brown, M. T., & Buck, C. S. (2008). A commercially available rosette system for

trace metal-clean sampling. Limnology and Oceanography: Methods, 6(9), 384–394. doi:10.4319/lom.2008.6.384
Methods

Milne, A., Landing, W., Bizimis, M., & Morton, P. (2010). Determination of Mn, Fe, Co, Ni, Cu, Zn, Cd and Pb in seawater using high resolution magnetic sector inductively coupled mass spectrometry (HR-ICP-MS). Analytica Chimica Acta, 665(2), 200–207. doi:10.1016/j.aca.2010.03.027
Methods

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Parameters

Parameter	Description	Units
EXPOCODE	Expedition code	unitless
STNNBR	Station number	unitless
CASTNO	Cast number	unitless
SAMPNO	Sample number	unitless
DATE	Date (UTC); format: yyyymmdd	unitless
TIME	Time (UTC); format: HHMM	unitless
LATITUDE	Latitude; positive values = North	degrees North
LONGITUDE	Longitude; positive values = East	degrees East
CTDPRS	Pressure; measured by CTD	decibars
CTDPRS_FLAG_W	WHP quality flag for CTDPRS	unitless
TEMPERATURE	Water temperature	degrees Celsius
TEMPERATURE_FLAG_W	WHP quality flag for TEMPERATURE	unitless
SALNTY	Salinity; PSS-78	psu
SALNTY_FLAG_W	WHP quality flag for SALNTY	unitless

OXYGEN	Oxygen	micromoles per kilogram (umol/kg)
OXYGEN_FLAG_W	WHP quality flag for OXYGEN	unitless
PHSPHT	Phosphate	micromoles per kilogram (umol/kg)
PHSPHT_FLAG_W	WHP quality flag for PHSPHT	unitless
SILCAT	Silicate	micromoles per kilogram (umol/kg)
SILCAT_FLAG_W	WHP quality flag for SILCAT	unitless
NITRAT	Nitrate	micromoles per kilogram (umol/kg)
NITRAT_FLAG_W	WHP quality flag for NITRAT	unitless
NITRIT	Nitrite	micromoles per kilogram (umol/kg)
NITRIT_FLAG_W	WHP quality flag for NITRIT	unitless
Mn	Manganese	nanomoles per liter (nmol/L)
Mn_FLAG_W	WHP quality flag for Mn	unitless
Fe	Iron	nanomoles per liter (nmol/L)
Fe_FLAG_W	WHP quality flag for Fe	unitless
Co	Cobalt	nanomoles per liter (nmol/L)
Co_FLAG_W	WHP quality flag for Co	unitless
Ni	Nickel	nanomoles per liter (nmol/L)
Ni_FLAG_W	WHP quality flag for Ni	unitless
Cu	Copper	nanomoles per liter (nmol/L)

Cu_FLAG_W	WHP quality flag for Cu	unitless
Zn	Zinc	nanomoles per liter (nmol/L)
Zn_FLAG_W	WHP quality flag for Zn	unitless
Cd	Cadmium	nanomoles per liter (nmol/L)
Cd_FLAG_W	WHP quality flag for Cd	unitless
Pb	Lead	nanomoles per liter (nmol/L)
Pb_FLAG_W	WHP quality flag for Pb	unitless
ISO_DateTime_UTC	Date and time (UTC) formatted to the ISO8601 format: yyyy-mm-ddTHH:MM:SSZ	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	GO-FLO Bottle
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	Thermo-Finnigan Element I (E1) HR-ICP-MS
Generic Instrument Name	Inductively Coupled Plasma Mass Spectrometer
Generic Instrument Description	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.

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 911plus CTD
Dataset-specific Description	Samples were collected using a rosette system, described in Measures et al. (2008), comprised of a Seabird SBE 911+ CTD, SBE 443 dissolved oxygen sensor, Wet Labs FL 1 fluorometer, and 12-L Teflon coated GO-FLO bottles. See Measures et al. (2008) for sampling procedures/protocols.
Generic Instrument Description	[tethered, real-time] The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus 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 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus 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

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Deployments

ZHNG02RR

Website	https://www.bco-dmo.org/deployment/58662
Platform	R/V Roger Revelle
Report	http://bcodata.whoi.edu/CLIVAR_AEROSOL/CLIVAR_P16S_2005ado.pdf
Start Date	2005-01-09
End Date	2005-02-19
Description	SIOGDC_Cruise_CruiseID: ZHNG02RR SIOGDC_Cruise_Name: ZHENG HE Expedition (ZHNG) A hydrographic/carbon/tracer survey in the South Pacific Ocean was carried out from R/V Roger Revelle from 9 January through 19 February 2005. The cruise departed from Papeete, Tahiti on 9 January, 2005. A meridional transect from 16 to 71 degrees South along 150 degrees West was completed. 111 full-depth CTD/rosette/LADCP casts (at one-half degree spacing), 4 shallow CDOM rosette casts, and 58 trace metals CTD/rosette casts were completed from 10 January to 11 February. Salinity, dissolved oxygen, and nutrients were analyzed for up to 36 water samples from each cast of the principal CTD/rosette program. Other parameters sampled included CFCs, helium, total inorganic carbon, alkalinity, radiocarbon, tritium, several parameters related to dissolved organic matter, and nitrogen-15. Additional deployments included 12 ARGOS floats and 21 Bio-Optics casts. The cruise ended in Wellington, New Zealand on 19 February 2005. EXPOCODE 33RR200501 was confirmed with the CLIVAR CCHDO (June 2011) and the other data sets from this cruise are available from the U.S. CLIVAR DAC at CCHDO from: https://cchdo.ucsd.edu/cruise/33RR200501 Cruise Track Image Cruise information and original data are available from the NSF R2R data catalog.

TN191A

Website	https://www.bco-dmo.org/deployment/58659
Platform	R/V Thomas G. Thompson
Report	http://bcodata.whoi.edu/CLIVAR_AEROSOL/CLIVAR_P16N_2006ado.pdf
Start Date	2006-02-14
End Date	2006-03-03
Description	R2R CruiseIds: TN191A, TN191B A hydrographic survey in the Central Pacific Ocean, nominally along 151-152°W between 22°S and 55°N. This CLIVAR repeat section was done during two cruises aboard Thomas Thompson, TN191A and TN191B. EXPOCODE 325020060213 was confirmed with the CLIVAR CCHDO (June 2011) and the other data sets from this cruise are available from the U.S. CLIVAR DAC at CCHDO from: https://cchdo.ucsd.edu/cruise/325020060213. Cruise Track Image Cruise information and original data are available from the NSF R2R data catalog.

TN191B

Website	https://www.bco-dmo.org/deployment/58784
Platform	R/V Thomas G. Thompson
Report	http://bcodata.whoi.edu/CLIVAR_AEROSOL/CLIVAR_P16N_2006ado.pdf
Start Date	2006-03-10
End Date	2006-03-30
Description	R2R CruiseIds: TN191A, TN191B A hydrographic survey in the Central Pacific Ocean, nominally along 151-152°W between 22°S and 55°N. This CLIVAR repeat section was done during two cruises aboard Thomas Thompson, TN191A and TN191B. EXPOCODE 325020060213 was confirmed with the CLIVAR CCHDO (June 2011) and the other data sets from this cruise are available from the U.S. CLIVAR DAC at CCHDO from: https://cchdo.ucsd.edu/cruise/325020060213. Cruise Track Image Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

Collaborative Research: Global Ocean Survey of Dissolved Iron and Aluminum and Aerosol Iron and Aluminum Solubility Supporting the Repeat Hydrography (CO2) Project (CLIVAR AEROSOL)

Website: http://www.clivar.org/

Coverage: Global

NSF Award Abstract:
A scientist from Florida State University in collaboration with colleagues from the University of Hawaii and the University of Washington will collect a suite of dissolved and particulate samples from surface waters and vertical profiles (12 depths), as well as atmospheric aerosol and rainwater samples during selected legs of the Repeat Hydrography CO2 cruises. The PIs plan to participate in the following four cruises: (1) the North Atlantic Ocean meridional section (20-25'W) during 2003; (2) the Pacific Ocean zonal section at 30'N during 2004; (3) the South Atlantic Ocean meridional section (20-25'W) in 2005; and (4) the South Pacific Ocean meridional section (150W) in 2005. Samples recovered during these cruises will be analyzed for Fe and Al. In addition, aerosol samples will be subjected to an ultrapure water leach to assess the fractional solubility of Fe and Al. This team of PIs also plans to collect and archive filtered and unfiltered water samples and aerosols for analysis by other scientists in the trace metal and tracer community. The primary objectives of this study is to generate an extensive database of Fe and Al concentrations in water and aerosol samples that can constrain

global and regional dust deposition models and determine the role that atmospheric Fe depositions have in delivering Fe to surface waters in the major basins of the world's oceans.

Note: This project is related to the follow-on project titled, "Collaborative Research: Global Ocean Survey of Dissolved Iron and Aluminum and Aerosol Iron and Aluminum Solubility Supporting the CLIVAR Repeat Hydrography Project (2007-2009)"

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Program Information

U. S. Climate Variability and Predictability (U.S. CLIVAR)

Website: http://www.usclivar.org/

Coverage: global

Note: The official U.S. CLIVAR program description will be supplied by Steve Diggs.

A temporary description copied from the US CLIVAR Web site is:

CLIVAR (Climate Variability and Predictability) is an international, interdisciplinary research effort within the World Climate Research Programme (WCRP) focusing on the variability and predictability of the slowly varying components of the climate system. CLIVAR investigates the physical and dynamical processes in the climate system that occur on seasonal, interannual, decadal and centennial time-scales. CLIVAR recognizes that a critical measure of success in its research program is a transferal of insight and knowledge to routine production of climate forecasts, information and products.

The goals of U.S. CLIVAR include:

- Identifying and understanding the major patterns of climate variability on seasonal, decadal and longer time scales and evaluating their predictability;
- Expanding our capacity in short term (seasonal to interannual) climate predictability and searching for ways to predict decadal variability;
- Better documenting the record of rapid climate changes and the mechanisms for these events, and evaluating the potential for abrupt climate changes in the future;
- Evaluating and enhancing the models used to project climate change due to human activity, including anthropogenically induced changes in atmospheric composition, and:
- Detecting and describing any climate changes that may occur.

Program Data: The data from most projects associated with the US CLIVAR program are not managed by BCO-DMO. Information about these projects and their results are available from the Program and Data site URLs shown above. However, there are a few exceptions, and those projects are listed below when the project section is expanded.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0223504
NSF Division of Ocean Sciences (NSF OCE)	OCE-0223378
NSF Division of Ocean Sciences (NSF OCE)	OCE-0223397

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