SIO-CTD rosette bottle basic CTD hydrographic and nutrient data from R/V Melville, R/V Roger Revelle cruises COOK19MV, DRFT08RR from the Southern Ocean, south of New Zealand in 2002 (SOFeX project)

Website: https://www.bco-dmo.org/dataset/2931
Version: 28 March 2007
Version Date: 2007-03-28

Project
» Southern Ocean Iron Experiment (SOFeX)

Programs
» Ocean Carbon and Biogeochemistry (OCB)
» Iron Synthesis (FeSynth)

Contributors	Affiliation	Role
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Wanninkhof, Rik H.	National Oceanic and Atmospheric Administration (NOAA-AOML)	Co-Principal Investigator
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Dataset Description

SIO-CTD Rosette bottle basic CTD hydrographic and nutrient data

Methods & Sampling

dates: 10 January 2002 to 10 February 2002 (20020110-20020210)
location: N: -54.093 S: -66.602 W: -172.153 E: -169.242
project/cruise: SOFeX/RR

Data Processing Description

Change history: YYMMDD
060110: original version prepared from an Excel file of merged CTD, nutrient
and SF6 data file, by Terry McKee (PO Dept, WHOI);
all units information taken from original .xls file;
060206: added to OCB database by Cyndy Chandler, OCB DMO, (cchandler@whoi.edu)
070328: dates and position information corrected to match Seabird header records

06 February 2006: Prepared for OCB data system by Terry McKee (PO Dept, WHOI) and Cyndy Chandler, OCB DMO (WHOI).

The SIO_bottle data object was prepared from an Excel file of
merged CTD, nutrient and SF6 data file for the SIO-CTD Rosette on Revelle.
Contact Zanna Chase (zanna@mbari.org) with questions the about the original data.
The Excel file was downloaded in December 2005 from the SOFeX data web site:

merged_SIO_CTD_nut_sf6.xls

Nutrients were run at MBARI on an Alpkem RFA.
Some vials thawed during transit and produced bad numbers; these have been excluded.

Note: Temp is T90 (ITS-90 scale confirmed from .btl file headers);
PO4, Si, NO3 and NO2 are all µM, micromolar

The event number, date, time, latitude
and longitude position information were taken from the *.hdr CTD header (NMEA) records.

SF6 data

SF6 data are from SF6_Revelle_final.xls posted by Kevin Sullivan in October, 2002

SF6_Revelle_final.xls

Questions concerning the SF6 data (October, 2002 revision) should go to Rik Wanninkhof or Kevin Sullivan (kevin.sullivan@noaa.gov).

Additional comments are available in the cruise report by Kevin Sullivan (SOFEX_report-kfsullivan.pdf; converted from the original Word .doc file)

These comments pertain to the original Excel workbook file:

For profile data (in "casts, purge&trap" worksheet):
These analyses, except on station #8, were done via purge and trap with a ~240 ml stripping chamber.
The samples for cast #8 were drawn into glass syringes and the water was equilibrated with added UHP nitrogen. The SF6 in the headspace was measured.

The station, cast, and niskin numbers were recorded by the SF6 analysts along with the SF6 results, which are reported in femtomoles per liter seawater. The hydro files were the source of the rest of the data.

When replicate sample bottles were drawn from the same niskin, the analyses are listed in the order of drawing.
A single open line separates individual casts; double open lines separate the visitations to the two enriched patches.

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Parameters

Parameter	Description	Units
event	unique sampling event number from event log (day of year and time (UTC))	doYhhmm
date	date sampling began (UTC)	YYYYMMDD
time	time sampling began (UTC)	hhmm
time_L	time, local (GMT +13)	hhmm
lon	longitude, negative denotes West	decimal degrees
lat	latitude, negative denotes South	decimal degrees
seafloor	seafloor depth	meters
station	station location number	dimensionless
cast	CTD cast number per cruise	dimensionless
bot	Rosette bottle number	dimensionless
press	pressure, from CTD Strain Gauge	decibars
depth	depth, calculated from pressure	meters
temp	temperature, from CTD, ITS-90 (from primary T0 sensor)	degrees Celsius
potemp	potential temperature, ITS-90 (from primary T0,C0 sensors)	degrees Celsius
sal	salinity, from CTD, PSS-78 (PSU) (from primary T0,C0 sensors)	dimensionless
sigma_0	sigma theta (potential density) (from primary T0,C0 sensors)	kilograms/meter^3
O2_ml_L	oxygen, dissolved	ml/liter
O2_sat	oxygen saturation	ml/liter
O2_satP	oxygen saturation, percent	percent
trans	transmissivity (CST-492D)	percent
fluor	fluorescence, chelsea FIC	unknown ??
PAR	Photosynthetically Available Radiation irradiance	unknown ??
SPAR	surface PAR irradiance	unknown ??
cond	conductivity	milliSiemens/centimeter
bat	unknown	unknown ??
sta	station identifier	dimensionless
O2_umol_kg	oxygen, dissolved	mM/kg
PO4	Phosphate	microMolar
Si	Silicon	microMolar
NO3	Nitrate	microMolar
NO2	Nitrite	microMolar
SF6	SF6	fM

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird 911
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific Description	CTD fitted with additional sensors: fluorometer, chelsea transmissometer altimeter irradiance (PAR) oxygen oxygen, temperature surface irradiance (SPAR)
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with 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

COOK19MV

Website	https://www.bco-dmo.org/deployment/57826
Platform	R/V Melville
Report	http://ocb.whoi.edu/SOFeX/CRUISES/proj_description.pdf
Start Date	2002-01-19
End Date	2002-02-26
Description	Brief cruise plan description: Three ships were involved in the SOFeX experiment. Each ship operated in the study area at a different time to afford the longest observation time. The designations SOFeX-N and SOFeX-S are sometimes used to distinguish between two iron enriched patches - one in low silicate waters north of the polar front (SOFEX-N), and the other in high silicate waters south of the polar front (SOFEX-S). All three ships, Melville (MV), Revelle (RR) and Polar Star (PS), worked in SOFEX-S, but only the Revelle and Melville worked in the SOFeX N patch and shuttled between the two patches. The R/V MELVILLE sailed several weeks after the R/V REVELLE to arrive in the study area just as the 'patches' were forming in response to iron fertilization. The MELVILLE's team planned to make detailed measurements of phytoplankton physiology and rate processes, and to sample daily for phytoplankton growth rates and biomass, soluble and particulate iron and zooplankton biomass. A cruise logbook includes daily entries filed by the Chief Scientist aboard each vessel. **Methods & Sampling** dates: 21 January 2002 to 21 February 2002 (20020121-20020221) location: N: -52.385 S: -66.611 W: -175.220 E: -166.946 project/cruise: SOFeX/MV **Processing Description** DMO notes: original version prepared from Scripps standard CTD (SIO CTD) casts Added to OCB: 07 February 2006 by Cyndy Chandler (cchandler@whoi.edu); all units information taken from bottle .BTL header records 10 February 2006: Prepared for OCB data system by Cyndy Chandler, OCB DMO (WHOI). The SIO_bottle data object was created from *.BTL files generated during the processing of CTD cast data with the standard suite of Seabird utilities. All final processed *.BTL CTD files were downloaded by the OCB DMO in February 2006 from the SOFeX web site at MBARI: http://www.mbari.org/SOFeX/Melville_Data/CTD/Melville_CTD.htm The date, time, latitude and longitude position information were taken from the CTD header records in the *.BTL files, and therefore disagree slightly with the entires for those CTD cast events in the cruise event http://ocb.whoi.edu/jg/serv/OCB/SOFeX/Melville/log.html0">Activity Log Final CTD cast header record from a .BTL file: http://ocb.whoi.edu/SOFeX/PI-NOTES/SIO_MV_002.BTL">SIO-CTD cast 2 Note: Temp is T90 (ITS-90 scale confirmed from .BTL file headers) only data from the primary temperature and conductivity sensors were kept for the final bottle data

DRFT08RR

Website	https://www.bco-dmo.org/deployment/57824
Platform	R/V Roger Revelle
Report	http://ocb.whoi.edu/SOFeX/CRUISES/proj_description.pdf
Start Date	2002-01-06
End Date	2002-02-14
Description	Brief cruise plan description: Three ships were involved in the SOFeX experiment. Each ship operated in the study area at a different time to afford the longest observation time. The designations SOFeX-N and SOFeX-S are sometimes used to distinguish between two iron enriched patches - one in low silicate waters north of the polar front (SOFEX-N), and the other in high silicate waters south of the polar front (SOFEX-S). All three ships, Melville (MV), Revelle (RR) and Polar Star (PS), worked in SOFEX-S, but only the Revelle and Melville worked in the SOFeX N patch and shuttled between the two patches. The R/V ROGER REVELLE from Scripps Institution of Oceanography sailed first. The REVELLE team added iron to two areas referred to as 'the North and South patches'. After the iron and an inert chemical tracer (SF6) were added, the REVELLE's primary mission was to map the size and characteristics of the South patch using a SeaSOAR fish towed behind the ship that pumped water up to the ship for sampling and analysis. The REVELLE also collected samples for initial biological shipboard mapping of iron concentrations, nutrients, chlorophyll, and photosynthetic efficiency. A cruise logbook includes daily entries filed by the Chief Scientist aboard each vessel. **Methods & Sampling** dates: 10 January 2002 to 10 February 2002 (20020110-20020210) location: N: -54.093 S: -66.602 W: -172.153 E: -169.242 project/cruise: SOFeX/RR **Processing Description** Change history: YYMMDD 060110: original version prepared from an Excel file of merged CTD, nutrient and SF6 data file, by Terry McKee (PO Dept, WHOI); all units information taken from original .xls file; 060206: added to OCB database by Cyndy Chandler, OCB DMO, (cchandler@whoi.edu) 070328: dates and position information corrected to match Seabird header records 06 February 2006: Prepared for OCB data system by Terry McKee (PO Dept, WHOI) and Cyndy Chandler, OCB DMO (WHOI). The SIO_bottle data object was prepared from an Excel file of merged CTD, nutrient and SF6 data file for the SIO-CTD Rosette on Revelle. Contact Zanna Chase (zanna@mbari.org) with questions the about the original data. The Excel file was downloaded in December 2005 from the SOFeX data web site: http://www.mbari.org/SOFeX/REVELLE_data.htm">merged_SIO_CTD_nut_sf6.xlshttp://www.mbari.org/SOFeX/REVELLE_data.htm">SF6_Revelle_final.xls Questions concerning the SF6 data (October, 2002 revision) should go to Rik Wanninkhof or Kevin Sullivan (kevin.sullivan@noaa.gov). Additional comments are available in the cruise report by Kevin Sullivan (http://ocb.whoi.edu/SOFeX/PI-NOTES/SOFEX_report-ksullivan.pdf">SOFEX_rep... converted from the original Word .doc file) These comments pertain to the original Excel workbook file: For profile data (in "casts, purge&trap" worksheet): These analyses, except on station #8, were done via purge and trap with a ~240 ml stripping chamber. The samples for cast #8 were drawn into glass syringes and the water was equilibrated with added UHP nitrogen. The SF6 in the headspace was measured. The station, cast, and niskin numbers were recorded by the SF6 analysts along with the SF6 results, which are reported in femtomoles per liter seawater. The hydro files were the source of the rest of the data. When replicate sample bottles were drawn from the same niskin, the analyses are listed in the order of drawing. A single open line separates individual casts; double open lines separate the visitations to the two enriched patches.

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Project Information

Southern Ocean Iron Experiment (SOFeX)

Website: http://www.mbari.org/expeditions/SOFeX2002/

Coverage: Southern Ocean, south of New Zealand

Before he passed away in 1993, John Martin suggested that an increase in the flow of iron-rich dust to the ocean causes phytoplankton (single celled algae) to grow. The increased photosynthesis removes carbon dioxide from surface waters as the algae create biomass. This carbon dioxide is replaced by carbon dioxide gas that flows into the sea from the atmosphere. Reduced carbon dioxide in the atmosphere cools the planet (CO_2 is a greenhouse gas that warms the earth). The results of this work, funded by the National Science Foundation, the Department of Energy, and the US Coast Guard, will be a much better understanding of how biological processes may regulate climate. (see Related Info: Fe cycle)

A direct test of the 'Martin Hypothesis' that trace concentrations of Fe are responsible for phytoplankton's ability to grow by direct experimental addition of Fe to the surface waters. Consequently the distribution of bioavailable Fe in the surface waters determines large geographical areas primary production and the following flux of fixed organic matter to the deep sea. The aim of the SOFeX project is to investigate the effects of iron fertilization on the productivity of the Southern Ocean. The results of this work will contribute significantly to our understanding of important biogeochemical processes which bear directly on the global carbon cycle, atmospheric carbon dioxide concentration, and climate control.

The SOFeX-N and SOFeX-S designations are sometimes used to distinguish between two iron enriched patches - one in low silicate waters north of the polar front (SOFEX-N), and the other in high silicate waters south of the polar front (SOFEX-S). All three ships, Melville (MV), Revelle (RR) and Polar Star (PS), worked in SOFEX-S, but only the Revelle and Melville worked in the SOFeX N patch and shuttled between the two patches.

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Program Information

Ocean Carbon and Biogeochemistry (OCB)

Website: http://us-ocb.org/

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO_2 and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

Iron Synthesis (FeSynth)

Coverage: Global

The two main objectives of the Iron Synthesis program (SCOR Working Group proposal, 2005), are:
1. Data compilation: assembling a common open-access database of the *in situ* iron experiments, beginning with the first period (1993-2002; Ironex-1, Ironex-2, SOIREE, EisenEx, SEEDS-1; SOFeX, SERIES) where primary articles have already been published, to be followed by the 2004 experiments where primary articles are now in progress (EIFEX, SEEDS-2; SAGE, FeeP); similarly for the natural fertilizations S.O.JGOFS (1992), CROZEX (2004/2005) and KEOPS (2005).

2. Modeling and data synthesis of specific aspects of two or more such experiments for various topics such as physical mixing, phytoplankton productivity, overall ecosystem functioning, iron chemistry, CO_2 budgeting, nutrient uptake ratios, DMS(P) processes, and combinations of these variables and processes.

SCOR Working Group proposal, 2005. "The Legacy of *in situ* Iron Enrichments: Data Compilation and Modeling".
http://www.scor-int.org/Working_Groups/wg131.htm

See also: SCOR Proceedings Vol. 42 Concepcion, Chile October 2006, pgs: 13-16 2.3.3 Working Group on The Legacy of *in situ* Iron Enrichments: Data Compilation and Modeling.

The first objective of the Iron Synthesis program involves a data recovery effort aimed at assembling a common, open-access database of data and metadata from a series of *in-situ* ocean iron fertilization experiments conducted between 1993 and 2005. Initially, funding for this effort is being provided by the Scientific Committee on Oceanic Research (SCOR) and the U.S. National Science Foundation (NSF).

Through the combined efforts of the principal investigators of the individual projects and the staff of Biological and Chemical Oceanography Data Management Office (BCO-DMO), data currently available primarily through individuals, disparate reports and data agencies, and in multiple formats, are being collected and prepared for addition to the BCO-DMO database from which they will be freely available to the community.

As data are contributed to the BCO-DMO office, they are organized into four overlapping categories:
1. Level 1, basic metadata
(e.g., description of project/study, general location, PI(s), participants);
2. Level 2, detailed metadata and basic shipboard data and routine ship's operations
(e.g., CTDs, underway measurements, sampling event logs);
3. Level 3, detailed metadata and data from specialized observations
(e.g., discrete observations, experimental results, rate measurements) and
4. Level 4, remaining datasets
(e.g., highest level of detailed data available from each study).

Collaboration with BCO-DMO staff began in March of 2008 and initial efforts have been directed toward basic project descriptions, levels 1 and 2 metadata and basic data, with detailed and more detailed data files being incorporated as they become available and are processed.

Related file

Program Documentation

The Iron Synthesis Program is funded jointly by the Scientific Committee on Oceanic Research (SCOR) and the U.S. National Science Foundation (NSF).

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