

# Pigments from HPLC analysis of bottle samples from SOFeX cruise PS02\_2002, COOK19MV, DRFT08RR from the Southern Ocean, south of New Zealand, Southern Ocean in 2002 (SOFeX project)

**Website:** <https://www.bco-dmo.org/dataset/2818>

**Version:** 09 February 2007

**Version Date:** 2007-02-09

## Project

» [Southern Ocean Iron Experiment](#) (SOFeX)

## Programs

» [Ocean Carbon and Biogeochemistry](#) (OCB)

» [Iron Synthesis](#) (FeSynth)

Contributors	Affiliation	Role
<a href="#">Bidigare, Robert R.</a>	University of Hawaii at Manoa (SOEST)	Principal Investigator
<a href="#">Landry, Michael R.</a>	University of California-San Diego (UCSD-SIO)	Co-Principal Investigator
<a href="#">Brown, Susan</a>	University of Hawaii at Manoa (SOEST)	Contact, Analyst
<a href="#">Chandler, Cynthia L.</a>	Woods Hole Oceanographic Institution (WHOI)	BCO-DMO Data Manager

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## Dataset Description

pigments from HPLC analysis of bottle samples

## Methods & Sampling

dates: 18 February 2002 to 20 February 2002 (20020218-20020220)

location: N: -65.85 S: -66.57 W: -172.93 E: -171.95

project/cruise: SOFeX/USCGC Polar Star (WAGB-10) cruise: PS02

Methodology: HPLC pigment analysis methods described in:

Bidigare, R. R., L. Van Heukelem and C. C. Trees. 2005. Analysis of algal pigments by high-performance liquid chromatography. In: Algal Culturing Techniques (R. A. Andersen, Ed.), Academic Press, New York, pp. 327-345.

## Data Processing Description

Change history: YYMMDD

061228: original data received from Susan Brown (UH Manoa);  
 070130: added to OCB database by Cyndy Chandler, OCB DMO, (cchandler@whoi.edu)  
 event, date, time and position data are from cruise event log  
 070328: modify data set after QC review by Susan Brown (UH Manoa)  
 see detailed list in DMO [processing notes file](#)  
 070503: data is now considered final following PI review  
 080213: added event\_SFX from multi-ship event log

PI note:

all pigment concentrations reported in nanograms per liter

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## Parameters

Parameter	Description	Units
event	unique sampling event composite of day, month, year and time (GMT)	DDMMYY_hhmm
DoY	day of year sampling began (UTC)	DoY
yrDay	day of year sampling began (UTC)	DoY.dd
date	date sampling began (GMT)	YYYYMMDD
time	time sampling began (GMT)	hhmm
lon	longitude, negative denotes West	decimal degrees
lat	latitude, negative denotes South	decimal degrees
station	station location name	dimensionless
bot	Rosette bottle number	dimensionless
depth	depth, calculated from pressure	meters
chlide_a	Chlorophyllide a; CHLDA	nanograms/liter
chl_c	Chlorophyll c; CHLC	nanograms/liter
peridinin	Peridinin; PER	nanograms/liter
fucox_but	19'-butanoyloxyfucoxanthin; BUT	nanograms/liter
fucox	Fucoxanthin; FUCO	nanograms/liter
fucox_hex	19'-hexanoyloxyfucoxanthin; HEX	nanograms/liter
diadinox	Diadinoxanthin; DDX	nanograms/liter
allox	Alloxanthin; ALLOX	nanograms/liter
diatox	Diatoxanthin; DTX	nanograms/liter
chl_b	Chlorophyll b; CHLB	nanograms/liter
chl_a	Chlorophyll a; CHLA	nanograms/liter
carotene_b	beta-carotene; B-CAR	nanograms/liter
chlide_chl_a	Chlorophyllide a plus chlorophyll a; TCHLA	nanograms/liter
patch_loc	sampling location relative to patch (see explanation in cruise event log)	dimensionless
event_SFX	unique SOFeX sampling event from multi-ship event log	YYYYdoYhhmm
event_MV	unique sampling event composite of day of year and time (UTC) (same format as Melville events)	doYhhmm
ev_type	event type descriptor string	dimensionless
sta	station location number	dimensionless

## Instruments

<b>Dataset-specific Instrument Name</b>	Niskin Bottle
<b>Generic Instrument Name</b>	Niskin bottle
<b>Generic Instrument Description</b>	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

## Deployments

### PS02\_2002

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57825">https://www.bco-dmo.org/deployment/57825</a>
<b>Platform</b>	USCGC Polar Star
<b>Report</b>	<a href="http://ocb.whoi.edu/SOFeX/CRUISES/proj_description.pdf">http://ocb.whoi.edu/SOFeX/CRUISES/proj_description.pdf</a>
<b>Start Date</b>	2002-02-11
<b>End Date</b>	2002-02-21
<b>Description</b>	<p>Cruise dates provided by David Forcucci, USCG Science Liaison 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 USCGC Polar Star was the third of the three vessels to occupy the SOFeX study area in 2002. The main focus of the scientific party aboard the Polar Star was to assess how much carbon was removed from the iron fertilized patches. The cruise report includes a more complete description of the Polar Star cruise and a cruise logbook includes daily entries filed by the Chief Scientist aboard each vessel.</p> <p><b>Methods &amp; Sampling</b>  dates: 18 February 2002 to 20 February 2002 (20020218-20020220) location: N: -65.85 S: -66.57 W: -172.93 E: -171.95 project/cruise: SOFeX/USCGC Polar Star (WAGB-10) cruise: PS02 Methodology: HPLC pigment analysis methods described in: Bidigare, R. R., L. Van Heukelem and C. C. Trees. 2005. Analysis of algal pigments by high-performance liquid chromatography. In: Algal Culturing Techniques (R. A. Andersen, Ed.), Academic Press, New York, pp. 327-345.</p> <p><b>Processing Description</b>  Change history: YYMMDD 061228: original data received from Susan Brown (UH Manoa); 070130: added to OCB database by Cyndy Chandler, OCB DMO, (<a href="mailto:cchandler@whoi.edu">cchandler@whoi.edu</a>) 070503: data is now considered final following PI review OCB DMO Note: event, date, and time agree with event log data; lat and lon position data are similar but not identical PI note: all pigment concentrations reported in nanograms per liter</p>

**COOK19MV**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57826">https://www.bco-dmo.org/deployment/57826</a>
<b>Platform</b>	R/V Melville
<b>Report</b>	<a href="http://ocb.whoi.edu/SOFEX/CRUISES/proj_description.pdf">http://ocb.whoi.edu/SOFEX/CRUISES/proj_description.pdf</a>
<b>Start Date</b>	2002-01-19
<b>End Date</b>	2002-02-26
<b>Description</b>	<p>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.</p> <p><b>Methods &amp; Sampling</b> dates: 29 January 2002 to 14 February 2002 (20020129-20020214) location: N: -65.89 S: -66.61 W: -172.30 E: -171.00 project/cruise: SOFeX/MV platform: R/V Melville Methodology: HPLC pigment analysis methods described in: Bidigare, R. R., L. Van Heukelem and C. C. Trees. 2005. Analysis of algal pigments by high-performance liquid chromatography. In: Algal Culturing Techniques (R. A. Andersen, Ed.), Academic Press, New York, pp. 327-345.</p> <p><b>Processing Description</b> Change history: YMMDD 061228: original data received from Susan Brown (UH Manoa); 070130: added to OCB database by Cyndy Chandler, OCB DMO, (<a href="mailto:cchandler@whoi.edu">cchandler@whoi.edu</a>) 070503: data is now considered final following PI review OCB DMO Note: event, date, time, lon and lat agree with event log data PI note: all pigment concentrations reported in nanograms per liter</p>

**DRFT08RR**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57824">https://www.bco-dmo.org/deployment/57824</a>
<b>Platform</b>	R/V Roger Revelle
<b>Report</b>	<a href="http://ocb.whoi.edu/SOFeX/CRUISES/proj_description.pdf">http://ocb.whoi.edu/SOFeX/CRUISES/proj_description.pdf</a>
<b>Start Date</b>	2002-01-06
<b>End Date</b>	2002-02-14
<b>Description</b>	<p>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.</p> <p><b>Methods &amp; Sampling</b>  dates: 10 January 2002 to 09 February 2002 (20020110-20020209) location: N: -54.093 S: -66.602 W: -172.153 E: -169.304 project/cruise: SOFeX/RR Methodology: HPLC pigment analysis methods described in: Bidigare, R. R., L. Van Heukelem and C. C. Trees. 2005. Analysis of algal pigments by high-performance liquid chromatography. In: Algal Culturing Techniques (R. A. Andersen, Ed.), Academic Press, New York, pp. 327-345.</p> <p><b>Processing Description</b>  Change history: YYYYMMDD 061228: original data received from Susan Brown (UH Manoa); 070130: added to OCB database by Cyndy Chandler, OCB DMO, (<a href="mailto:cchandler@whoi.edu">cchandler@whoi.edu</a>) event, date, time and position data are from cruise event log 070328: modify data set after QC review by Susan Brown (UH Manoa) see detailed list in DMO <a href="http://ocb.whoi.edu/SOFeX/PI-NOTES/pigments_RR.html">http://ocb.whoi.edu/SOFeX/PI-NOTES/pigments_RR.html</a>"&gt;processing notes file 070503: data is now considered final following PI review 080213: added event_SFX from multi-ship event log PI note: all pigment concentrations reported in nanograms per liter</p>

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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<sub>2</sub> 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<sub>2</sub> 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, SOREE, 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<sub>2</sub> 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](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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