# Downwelling PAR measured above the surface of the ocean from R/V Melville cruise COOK19MV from the Southern Ocean, south of New Zealand in 2002 (SOFeX project)

**Website**: https://www.bco-dmo.org/dataset/2963
**Version**: 15 August 2008
**Version Date**: 2008-08-15

**Project**
» Southern Ocean Iron Experiment (SOFeX)

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

| Contributors | Affiliation | Role |
|---|---|---|
| Hiscock, Michael R. | Duke University | Principal Investigator |
| Chandler, Cynthia L. | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager |

## Table of Contents



## Dataset Description

Downwelling photosynthetically active radiation (400 - 700nm, PAR) measured above the surface of the ocean

### Methods & Sampling

**dates:** 20 January 2002 to 21 February 2002 (20020120-20020221)
**location:** N: -52.385 S: -66.611 W: -175.220 E: -166.946

Methodology: Downwelling photosynthetically active radiation (400 - 700nm, PAR) measured above the surface of the ocean -- Ed(0+). Irradiance was measured with a Biospherical Instruments (serial #10127, calibrated 11/1/01) cosine collector mounted on top of the crane hanger on the port side stern quadrant of the R/V Melville. There was very little, if any, ship-shading at this site. Additionally, this site was close to the on-deck incubator farm.

### Data Processing Description

Change history:
070509: downloaded original zipped data (PAR.zip) and plots (Par.pdf) from SOFeX project data web site.
070511: unzip PAR.zip to Melville_PAR_submit.xls
080815: added to OCB database by Cyndy Chandler, OCB DMO, (cchandler@whoi.edu)

OCB DMO Note: Four worksheets were contained in the original file: Documentation, January, February,

and Daily_PAR. Contents of January and February files have been combined to create this data set. The Documentation and Daily_PAR worksheets are reproduced in the PI note below. The locaton range bounding box above is an estimate. No location data were reported with the PAR data files.

PI note: Irradiance data was collected over time periods of 5 seconds to 30 seconds. In two of the worksheets (January, February), the mean, minimum, maximum, standard deviation, and number of data points is given for each time interval.

Contact: Mike Hiscock (hiscock@duke.edu)
135 Duke Marine Lab Road
Beaufort, NC 28516

Daily PAR summary table of the total daily PAR from sunrise to sunset.
There is also an accompanying PDF format file with graphs of PAR vs. time.

| Local Day | Ed(0+) is E(sub)d(0^+) Ed(0+) downwelling PAR just above the surface of the ocean, integrated over one day. (mol quanta m-2 d-1 ) |
|---|---|
| 1/22/2002 | 33.9 |
| 1/25/2002 | 47.3 |
| 1/26/2002 | 39.3 |
| 1/27/2002 | 38.4 |
| 1/28/2002 | 17.8 |
| 1/29/2002 | 39.8 |
| 1/30/2002 | 10.5 |
| 1/31/2002 | 22.2 |
| 2/01/2002 | 20.5 |
| 2/02/2002 | 21.4 |
| 2/03/2002 | 14.3 |
| 2/04/2002 | 11.6 |
| 2/05/2002 | 21.0 |
| 2/06/2002 | 18.5 |
| 2/07/2002 | 16.9 |
| 2/08/2002 | 28.6 |
| 2/09/2002 | 15.8 |
| 2/10/2002 | 9.5 |
| 2/11/2002 | 22.1 |
| 2/12/2002 | 36.4 |
| 2/13/2002 | 43.8 |
| 2/14/2002 | 30.9 |
| 2/15/2002 | 18.6 |
| 2/16/2002 | 12.4 |
| 2/18/2002 | 27.2 |
| 2/21/2002 | 23.7 |

[ table of contents | back to top ]

## Data Files

| File |
|---|
| **PAR.csv** (Comma Separated Values (.csv), 3.59 MB) MD5:2cf0a025bcbffbbd2e01fae918595395 Primary data file for dataset ID 2963 |

[ table of contents | back to top ]

## Parameters

| Parameter | Description | Units |
|---|---|---|
| date | date sampling began (UTC) | yyyymmdd |
| time | time sampling began (UTC) | hhmmss |
| date_L | local date | yyyymmdd |
| time_L | local time (UTC+13) | hhmmss |
| PAR_mean | mean PAR | umol quanta m-2 s-1 |
| PAR_min | minimum PAR | umol quanta m-2 s-1 |
| PAR_max | maximum PAR | umol quanta m-2 s-1 |
| PAR_sd | PAR standard deviation | dimensionless |
| num_dp | number of data points | dimensionless |

[ table of contents | back to top ]

## 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.<br><br>**Methods & Sampling**<br>dates: 20 January 2002 to 21 February 2002 (20020120-20020221) location: N: -52.385 S: -66.611 W: -175.220 E: -166.946 Methodology: Downwelling photosynthetically active radiation (400 - 700nm, PAR) measured above the surface of the ocean -- Ed(0+). Irradiance was measured with a Biospherical Instruments (serial #10127, calibrated 11/1/01) cosine collector mounted on top of the crane hanger on the port side stern quadrant of the R/V Melville. There was very little, if any, ship-shading at this site. Additionally, this site was close to the on-deck incubator farm.<br><br>**Processing Description**<br>Change history: 070509: downloaded original zipped data (PAR.zip) and plots (Par.pdf) from SOFeX project data web site. 070511: unzip PAR.zip to Melville_PAR_submit.xls 080815: added to OCB database by Cyndy Chandler, OCB DMO, (cchandler@whoi.edu) OCB DMO Note: Four worksheets were contained in the original file: Documentation, January, February, and Daily_PAR. Contents of January and February files have been combined to create this data set. The Documentation and Daily_PAR worksheets are reproduced in the PI note below. The locaton range bounding box above is an estimate. No location data were reported with the PAR data files. PI note: Irradiance data was collected over time periods of 5 seconds to 30 seconds. In two of the worksheets (January, February), the mean, minimum, maximum, standard deviation, and number of data points is given for each time interval. Contact: Mike Hiscock (hiscock@duke.edu) 135 Duke Marine Lab Road Beaufort, NC 28516 Daily PAR summary table of the total daily PAR from sunrise to sunset. There is also an accompanying PDF format file with http://ocb.whoi.edu/SOFeX/PI-NOTES/MV_PAR.pdf">graphs of PAR vs. time. Ed(0+) is E(sub)d(0^+) Ed(0+) downwelling PAR just above the surface of the Local Day ocean, integrated over one day. (mol quanta m-2 d-1 ) 1/22/2002 33.9 1/25/2002 47.3 1/26/2002 39.3 1/27/2002 38.4 1/28/2002 17.8 1/29/2002 39.8 1/30/2002 10.5 1/31/2002 22.2 2/01/2002 20.5 2/02/2002 21.4 2/03/2002 14.3 2/04/2002 11.6 2/05/2002 21.0 2/06/2002 18.5 2/07/2002 16.9 2/08/2002 28.6 2/09/2002 15.8 2/10/2002 9.5 2/11/2002 22.1 2/12/2002 36.4 2/13/2002 43.8 2/14/2002 30.9 2/15/2002 18.6 2/16/2002 12.4 2/18/2002 27.2 2/21/2002 23.7 |

[ table of contents | back to top ]

## 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

(CO2 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.

[ table of contents | back to top ]

---

## Program Information

**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, CO2 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).

**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 CO2 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.

[ table of contents | back to top ]