

WDC-MARE Reports

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2005



**International Collection of JGOFS
(Joint Global Ocean Flux Study)**

Volume 2: Integrated Data Sets (1989-2003)

Rainer Sieger, Hannes Grobe, Michael Diepenbroek, Uwe Schindler,
Reiner Schlitzer (Editors), JGOFS DMTT & IPO

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WORLD DATA CENTER FOR MARINE ENVIRONMENTAL SCIENCES

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Scope of the Reports

The WDC-MARE Reports aim is to publish scientific results as provided through the data management units of research institutes and national and international projects. These scientific results comprise collections and compilations of data accompanied by their describing meta-information as well as technical notes. Usually the reports are accompanied by a CD-ROM/DVD that contains the project related data sets in a consistent technical ASCII-format. The content of the medium represents the information as stored in the information system PANGAEA at the time of publication. WDC-MARE Reports appear in irregular intervals.

Access information

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An electronic version of the reports and guidelines for authors can be downloaded from the WDC-MARE web site at <http://www.wdc-mare.org/reports>.

The most recent version of all data can be retrieved on the Internet from the PANGAEA® - Publishing Network for Geoscientific & Environmental Data at <http://www.pangaea.de>

This report has an international distribution, available through libraries with a scope on marine research literature. Additional paper/CD copies are available from the editor:

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International Collection of JGOFS

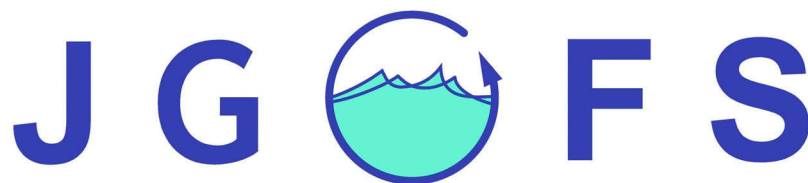
(Joint Global Ocean Flux Study)

Volume 2: Integrated Data Sets (1989-2003)

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DMTT = Data Management Task Team

IPO = International Project Office

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1 Introduction to the Joint Global Ocean Flux Study

The Joint Global Ocean Flux Study (JGOFS) was an international and multidisciplinary, marine research project with participants from more than 20 nations. JGOFS was launched in 1987 at a planning meeting in Paris under the auspices of the Scientific Committee of Oceanic Research (SCOR), interdisciplinary body of the International Council for Science (ICSU). Two years later, JGOFS became one of the first core projects of the International Geosphere-Biosphere Programme (IGBP), another ICSU interdisciplinary body.

The following scientific goals were published in 1990 in the science plan:

- to determine and understand on a global scale the processes controlling the time-varying distribution and fluxes of carbon and associated biogenic elements in the ocean, and to evaluate the related exchanges with the atmosphere, sea floor and continental boundaries,
- to develop a capacity to predict on a global scale the response to anthropogenic perturbations, in particular those related to climate change.

To accomplish these scientific goals, the following "operational goals" for the project were adopted:

- an assessment of large-scale carbon fluxes, obtained from a greatly increased network of observations;
- a set of models that express our understanding of the processes controlling large-scale carbon fluxes;
- a procedure for observing the ocean in a routine, synoptic manner to detect possible changes in the ocean carbon cycle in response to climate change;
- a better knowledge and understanding of fluxes across the continental margins, to provide reliable boundary conditions for global models;
- a well-cared-for data set, comprising observations made according to standard protocols and a system for providing subsets to researchers;
- an increased number of countries with an interest and skills in planning JGOFS-type activities and making the appropriate measurements and global-scale inferences.

JGOFS research activities included national and international process studies conducted in different ocean basins, a global survey of inorganic carbon and time-series programmes. JGOFS brought together biological, chemical, physical and geological oceanographers and modellers in a multidisciplinary investigation of the distribution and dynamics of carbon and associated biogenic elements in the ocean.

2 Data management within JGOFS

The first meeting of a JGOFS Working Group on Data Management occurred in Halifax, Canada, in 1988. This meeting laid the foundation of a data policy for JGOFS. The JGOFS data management plan was then developed so each country could have a data manager responsible for its national data sets. As a consequence, in the course of the JGOFS project, data either were managed by a national JGOFS data manager (e.g., Australia, Canada, France, Germany, India, Japan, U.K. and

U.S.), or, elsewhere, resided with individual data originators. Afterwards, in order to coordinate internationally the data management efforts, the group was reorganised in a JGOFS Data Management Task Team (DMTT), which agreed in 1997 that their primary responsibilities were:

- to develop, test and implement timely data exchange mechanisms between the national groups participating in the regional Process Studies, the Global (inorganic) Carbon Survey and the long-term Time Series Stations,
- to identify ways in which the management of JGOFS data at the national level may be initiated, encouraged and developed,
- to develop mechanisms for the integration of national data management initiatives at the international level,
- to develop an integrated data inventory at the international level and make this available to the scientific community,
- to monitor the international acceptance of, and compliance with, the statement on data submission and access adopted by the JGOFS Scientific Steering Committee (SSC) at its third session in September 1989, and to recommend changes to this policy if needed,
- to liaise with other international programmes and organisations such as WOCE, IGBP, IOC and appropriate national and international data centres,
- to provide advice and direction to the JGOFS data management resources within the International Project Office (IPO), and
- to report to the SSC and implement its recommendations.

In May 2003, members of the DMTT/IPO edited and published a data product on DVD entitled

JGOFS International Collection, Volume 1: Discrete Datasets (1989-2000),

with the financial support from the JGOFS IPO, and the logistical support of the World Data Center for Oceanography, Silver Spring, USA, which acted as the publisher. Vol. 1 is a compilation of individual data sets that were acquired and compiled by data managers from JGOFS-participating countries. The DVD has been distributed since the final JGOFS Open Science Conference in May 2003, directly to conference participants and through each DMTT representative from Australia, Canada, France, Germany, India, Japan, United Kingdom and United States.

Due to the lack of international financial support to compile all JGOFS international data into a common file and data format, to be distributed internationally, on Vol. 1 the data sets were copied “as is” onto the DVD either from CD-ROMs published previously or simultaneously, or from online accessible national repositories. Each data set or data source had its own unique format, documentation, citation policy, data quality protocol and machine compatibility limitations.

3 JGOFS data archiving at WDC-MARE

Following an initiative by German JGOFS scientists, a representative of the World Data Centre for Marine Environmental Sciences (WDC-MARE) was invited to the DMTT meeting in January 2002 to present the information system PANGAEA and how its technology could help in the production of the anticipated, international JGOFS data product. WDC-MARE was also invited at the “*data rescue*” meeting organised by the IPO in June 2002 to secure the contributions of several JGOFS-participating countries not represented in the DMTT within the international JGOFS data product. This was also an opportunity to present to a broader audience the newly approved WDC-MARE and the PANGAEA system for the production of an integrated JGOFS data product. Finally, several JGOFS representatives met in January 2003 at WDC-MARE to start the initiative aiming at the full online accessibility and long-term archiving of all integrated JGOFS data sets and metadata through the WDC system.

WDC-MARE agreed

- to convert, harmonize and archive all data sets in the information system PANGAEA - Publishing Network for Geoscientific & Environmental Data,
- to make the data accessible through its online search engine PangaVista (www.pangaea.de/PangaVista), and
- to publish the data as “*International Collection of JGOFS. Volume 2: Integrated Data Sets*” on CD in 2005.

During its final meeting, in March 2003 the DMTT supported the plan to publish this second CD and a companion report in paper version within the “*WDC-MARE Reports*” series. The DMTT and IPO agreed to help the WDC-MARE team producing this second CD volume until JGOFS ended in December 2003, and afterward, on a voluntary basis. It was anticipated some continuity is maintained between JGOFS and forthcoming IMBER project, and some liaison with the IMBER Transition Team and its parent bodies IGBP and SCOR, to ease the work of WDC-MARE for the production of CD Vol. 2. During its final meeting, in September 2003, the JGOFS Executive Committee supported the plan.

4 About this product

The *JGOFS International Collection Volume 2: Integrated Data Sets* CD is a coherent, organised compilation of existing data sets produced by member countries which participated in JGOFS. In most cases, the data were gathered from the *JGOFS International Collection, Volume 1: Discrete Datasets* DVD. To produce Vol. 1 data were taken from the original sources and copied “as is” on the DVD. For Vol. 2 data and metadata have been harmonized using the conversion software PanTool and the import routine of PANGAEA checking for completeness of metadata and defining the relations between data and metadata. Prior to the import, data had performed a technical quality control, i.e. format and readability of the file, availability and combination of parameters and units, range of values. Whenever possible data sets have been visualized with the ODV (Ocean Data View) or PanPlot software for a

rough overview and visual control. In some cases the original units were converted to standard units used in PANGAEA to allow the user to produce new compilations of specific parameters from different sources. The harmonized version represents about 67400 data sets in total, converted from some hundred different original formats. The availability through PANGAEA ensures a long-term archiving, future updates and access via the Internet. To produce this CD product, all data sets were extracted from PANGAEA and organized in a directory structure on a CD together with a search capability through a self installing local web server.

Data harmonization

With the production of a JGOFS integrated data set, WDC-MARE and the DMTT have found the optimal solution to archive complex data with thousands of parameters and to give them the added value they need to have for data mining and for use in future projects. The JGOFS data collection consists of 4138 different parameters which are added as a list on this CD (see parameter-jgofs.txt). The output tables, technically generated by a relational database management system with middleware running on an application server, ensure a consistent organisation of the metadata documentation, heading the each scientific primary data file. The universal search capability added as front end software enables the user to find and download those data of interest.

5 Disclaimer about data quality and access

Data have undergone scientific quality checks conducted only by the initial data originator or manager and thus the quality of the data is solely in the responsibility of the PI who is given in the metaheader of each data set. No further quality control was performed by WDC-MARE during the technical harmonization and import process. Users are cautioned to keep this in mind !

Due to time constraints, not all data providers had the opportunity to cross-check their data in PANGAEA before the production of the CD. Thus, WDC-MARE does not warrant that the information contained on this CD or retrieved from the PANGAEA information system is free from errors or omissions. WDC-MARE shall not be in any way liable for any loss, damage or injury suffered by the user consequent upon, or incidental to, the existence of errors or omissions in the information.

Whenever a data originator, a data manager or a data user finds errors in the data or metadata, WDC-MARE should be contacted so that data corrections, data additions or warning notifications could be made or quality flags could be added. PANGAEA will always present online the most recent version of the JGOFS data collection.

As its operating platform, data base and archive system WDC-MARE makes use of the information system PANGAEA – Publishing Network for Geoscientific & Environmental Data at <http://www.pangaea.de> which is a universal library for georeferenced data to be published on the Internet. The system is operated in the sense of the **Budapest Open Access Initiative 2002**

(see <http://www.soros.org/openaccess/>)

and guarantees long-term availability of scientific primary data related to publications following the **Recommendations of the Commission on Professional Self Regulation in Science** for safeguarding good scientific practice 1998.

The policy of data management and archiving at WDC-MARE follows the **Principles and Responsibilities of ICSU World Data Centers** 1987

(see <http://www.ngdc.noaa.gov/wdc/guide/gdsystema.html>).

It may seem unnecessary to publish data as a static collection on CD, if the data are available on the Internet through a dynamic data library, where content can be added and modified at any time. This publication has a global distribution through the major libraries and marine research institutes and thus should help to bridge the 'digital divide' between developed and developing countries with limited Internet access - as demanded and supported by IOC/IODE. It should also help to make the data management efforts of WDC-MARE better known to the oceanographic community. Additionally a local installation has much faster download times if searching for larger subsets from the full inventory.

6 Citation of CD Vol. 2

Under the terms of the WDC data policy, the compiled and harmonized data on this CD will have entered the public domain by the time the CD is published. The data are intended mainly for scholarly use by the academic and scientific community, with the express understanding that any such use will properly acknowledge the originating investigator(s) and references as provided in the data documentation.

The following is the accreditation we request for users of the JGOFS data compilation:

- (1) the original **reference** (if given) or
- (2) the data set **citation**, including the CD cited as

**International Collection of JGOFS (Joint Global Ocean Flux Study)
Volume 2: Integrated Data Sets (1989-2003). Sieger, R et al., JGOFS DMTT & IPO, WDC-MARE Reports 0003, 15 pp with CD-ROM, World Data Center for Marine Environmental Sciences, Bremen/Bremerhaven, Germany, 2005.**

Whenever using data that have been downloaded from a CD published by WDC-MARE or from the information system PANGAEA at <http://www.pangaea.de>, please always:

Quote the original citation and reference !
Acknowledge the respective project !

Please contact the WDC-MARE office with any comments or questions pertaining to this publication (info@pangaea.de).

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8 Technical description of file structure and CD

The data inventory on this CD is a copy of the PANGAEA content at the time of publication. The CD enables the user to access the data through a computer system locally. Data sets are stored in the folder \docs\datasets\ as tab-delimited text (ASCII) files organized in seven zip-archives. Each of the 67400 data sets consists of the data description (meta-information) followed by the scientific primary data.

Data Description

consists of the following fields (not necessarily all may be in use):

- (1) Citation - is the formal correct citation to use if you refer to a specific data set (e.g., in a publication). Part of the citation is a DOI (Digital Object Identifier) as a persistent identifier which can be resolved globally; (see <http://www.doi.org> for further information about the DOI system).
- (2) Reference(s) - is/are the related publication(s) in which the data set is used;
- (3) Project(s) - is/are the framework under which the data set has been produced or compiled; (for this compilation it is always 'JGOFS', but other projects might be added)

- (4) Spatial Coverage - gives the four geographic boundaries (W-E-S-N) of a rectangle around a data set; if the data are related to one sampling point, W and E as well as N and S have identical values;
- (5) Event(s) - correspond(s) to the label of the sample taken by a device at a certain geographical spot (synonyms are “site”, “station” or “sample”) Further event specification include latitude, longitude, and elevation, as well as device type, campaign label, and the name of the basis (ship) used;
- (6) Comment - individual comments related to the data as given by the PI;
- (7) Further details - may provide a link to a detailed data set description as provided by the PI;
- (8) Parameter(s) - shows the list of parameters with unit for which data column which exists in the data set. Each parameter is related to at least one column showing a ‘Short Name’ as used in the header of the data matrix, the ‘Principle Investigator’ (PI), the method and optional comments;
- (9) Size - displays either the number of data values or points of the data set. The size of the downloaded data set approximates a tenth of the number of data points in Kilobyte.

Data

The data table consist of a header line followed by the data matrix. The header may display:

- Event label i.e. the name of the station/sample (only in tables containing data from several locations);
- one to several geo-codes, i.e. *Latitude, Longitude, Depth, water [m], Depth, sediment [m], Date/Time*;
- one to many parameter with [unit].

Surface or space related data sets display latitude and longitude for each data point, time series may include date/time; any line of the data table comprises at least one respective geo-code which is given in the metaheader if not configured into the data table.

Additional information may be given for some fields in the data description as a link pointing to other web sites or sending an email, e.g. a link with the projects name will lead the user to the projects home page, the DOI or URL given with a reference enables the download of the publication or shows the related abstract in a bibliographic portal. Similar may appear for hyper-linked fields like ‘Method’, ‘Parameter’ or ‘Further details’. Any meta-information behind the links given in the metaheader can be variable and may come from different external sites, not in the responsibility of WDC-MARE. Those links can only be accessed if the computer is connected to the Internet. Related documents are stored on the CD and will be loaded directly.

Each name of a file in the zip-archives consist of a five (ignore a leading zero) to six digit number followed by the extension *.tab. This number is part of the DOI; e.g. if a filename is 124718.tab the related DOI is 10.1594/pangaea.124718. Using a DOI-resolver (see <http://doi.org/>), this number will guide the user to the related data set in Pangaea. (Pangaea also provides a DOI resolver at <http://doi.pangaea.de>).

CD-Access

To read the CD, you need access to a computer with a CD reading device. In order to attain full performance we recommend the following software (minimum requirement):

- *Linux*: SUSE, Novel Linux, Gentoo, Debian, Redhat
- *Macintosh*: Mac OS X
- *Solaris*: Version 8
- *Windows*: Windows 2000/XP using Java Runtime Engine JRE 1.3 or higher

Usually, no manual installation is needed since the CD starts automatically while inserted.

The data collection is supplied with a simple search engine, allowing access to the inventory. The search engine is running on a local auto installing web server supplied with the CD. Both the web server and the database engine are built on Java™ Technology.

In order to run the database properly, your computer must have a Java Runtime Engine (JRE) installed. On *Linux*, *Macintosh*, and *Solaris* computers JRE is already part of the operating system. Computers using the *Windows* operating system need separate installation of JRE. The start-up routine supplied on the CD will automatically detect the respective computer system, the version of its operating system check the JRE version. If JRE is not installed or the version number is not appropriate, the start-up routine will offer to install the most recent JRE version.

The CD will start automatically once you have inserted it in your CD device. If the CD does not start automatically, you can launch it manually:

- *Linux, Solaris, Unix, etc.*: execute **sh unixstart.sh** from terminal and follow the instructions;
- *Macintosh*: double click the **macstart** application;
- *Windows*: double click the file **winstart.exe**.

If the Java™ environment is not found on your system, the starting procedure offers the option to install the latest JRE, see <http://www.java.com/>. Be aware that JavaScript must be enabled in your browser configuration. If your browser does not display the homepage after having started the local web-server, you should disable proxies in your browser configuration. If you cannot do so due to firewall or access restrictions, ask your system administrator, add 127.0.0.1 to the proxy exemptions, or send an e-mail to tech@pangaea.de.

Creating search queries

Assuming that the search engine PANGAVISTA properly displays the search query mask you can create queries. To enter a search query, just type in one to several descriptive words and hit the <Enter> key or click on the <Search> button. Since the search engine only returns data sets that contain all the words in your query, refining or narrowing your search is as simple as adding more words to the search terms you have already entered. A 'Help' text with search examples is provided below the 'Search' button.

The user may search for any words included in a data set, e.g. a name of a principle investigator or a parameter. The list of parameters used within JGOFS can be found on the CD in the file *parameter-jgofs.txt*.

A search query typically results in a list of data sets that subsequently can be accessed by striking a hot link. The outcome displays the *Data description* and at its end the options to:

- Download data set as tab-delimited text or
- View data set as HTML.

Data are provided in standard tab-delimited ASCII-format and can be processed with a variety of analysis and visualization software packages, including **Ocean Data View**, (<http://odv.awi-bremerhaven.de>), PanPlot or PanMap (<http://www.pangaea.de/Software>). Additionally, the entire result set (i.e. all data sets found and listed) can be loaded as a zip-archive.

The converter **Pan2Applic** which is provided with this CD, can be used to transfer single files, folders of files, or a zip-archive from the PANGAEA output format to formats of the applications listed above. Also a flat georeferenced text file may be produced for individual processing. Further output formats of general importance may be included in Pan2Applic on request to info@pangaea.de.

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