ICSU World Data Centers with marine holdings

Many World Data Centers are available for the stewardship of data from IGBP/SCOR marine research projects. This document provides summaries of centers which deal with some types of marine data. In addition, the document includes a statement of the principles and responsibilities of ICSU World Data Centers and a map of all World Data Centers.

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World Data Center for Atmospheric Trace Gases, Oakridge

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Maintained by: Oak Ridge National Laboratory, managed by Lockheed Martin Energy Systems Inc. for the U.S. Department of Energy. The WDC for Atmospheric Trace Gases, Oakridge is operated by, and collocated with, the Carbon Dioxide Information Analysis Center (CDIAC), sponsored by the U.S. Department of Energy's Environmental Sciences Division.

Summary of Data Held: Varied data on emissions of radiatively active trace gases and their concentrations in the atmosphere, oceans, and the biosphere, including:

- Time series of concentrations of carbon dioxide (CO2), ozone, methane, nitrous oxide, chlorofluorocarbons (CFCs), CFC replacement species, and HCFCs from ice cores and monitoring stations around the world.
- Global, regional and national emissions of carbon dioxide from fossil fuel combustion and cement manufacturing, 1950-1993; decadal carbon dioxide emissions on a 1 degree x 1 degree lat/long global grid, 1950-1990.
- Carbon storage in ecosystems, on a 1/2 x 1/2 degree lat/long global grid.
- Oceanic 14C, partial pressure of CO2, total CO2, and total alkalinity measurements.
- Organic soil carbon and nitrogen profiles.
- Atmospheric and oceanic carbon isotope measurements.
- Historic land-use changes and corresponding carbon emissions.
- Tropospheric and stratospheric optical depth measurements.
- Computer projections of fossil fuel CO2 emissions based on demographic and energy parameters for 1975-2100.

User Services: Open to visitors during normal working hours; advance notification recommended (required for non-US citizens).

World Data Center for Biodiversity and Terrestrial Ecology, Denver

Dr. Mark Fornwall, Director WDC for Biodiversity and Terrestrial Ecology U.S. Geological Survey Center for Biological Informatics Bldg. 810 DFC, MS 302 Denver, CO 80225 U.S.A. Tel: +1 303 202-4215 Fax: +1 303 202-4219 Internet: http://biology.usgs.gov/cbi/ WWW Home Page: http://wdc.nbii.gov/

Maintained by: WDC for Biodiversity and Terrestrial Ecology is operated by: U.S. Geological Survey Center for Biological Informatics

Summary of Data Held: : The WDC for biodiversity and terrestrial ecology contains data related to federal, state, non-profit, university, and private sector research data and information gathered within the United States. This information includes land cover, species information, regional information throughout the U.S., national level data and information related to bird conservation, invasive species, fisheries and aquatic resources, wildlife disease, and amphibian decline.

User Services: The WDC for Biodiversity and Terrestrial Ecology provides access to data in both a local traditional access method and through its distributed network of National Biological Information Infrastructure (NBII) Regional and Thematic Nodes throughout the country. Tours are available of the Center for Biological Informatics, Denver Colorado, where the core capabilities and various data are held.

Publications: An annual catalog of data and information contained within the WDC for Biodiversity and Terrestrial Ecology is produced. Data holding can also be accessed through the NBII metadata clearinghouse, http://metadata.nbii.gov. Additional publications related to ecological forecasting, invasive species, biodiversity and ecosystems needs for the future are just a small sample of the publications that can be found through accessing the WDC.

Special Projects: The WDC for Biodiversity and Terrestrial Ecology can also support other interactions, data sharing, and the basic research process through the use of its collaborative and virtual portal technologies and tools. Communities of practice can be created to allow the WDC system to interact virtually in meeting its overall goals and objectives as a WDC system.

World Data Center for Climate, Hamburg

Dr. Michael Lautenschlager, Director WDC for Climate Model and Data Max-Planck-Institut für Meteorologie Bundesstrasse 55 D-20146 HAMBURG Germany Tel: +49 40 41173 297 Fax: +49 40 41173 400 Internet: data@dkrz.de WWW Home Page: http://www.mad.zmaw.de/wdcc

Maintained by: Model and Data (M&D) hosted at the Max-Planck-Institute for Meteorology. The WDC is realised in cooperation with the German Climate Computing Centre (DKRZ).

Summary of Data Held: The WDC for Climate is aimed at collecting, scrutinizing, and disseminating data related to climate change on all time scales. Emphasis is on data products from climate modelling and related observational data. The WDC focuses on geo-referenced data using the operational CERA data and information system. Input is accepted in electronic form, specifics have to be discussed with the WDC staff.

User Services: The WDC for Climate is located in the Max-Planck-Institute for Meteorology (address see above). A visiting scientist program exists. Data processing, copying and analysis facilities are available. Data are available on most media including CD-ROM, via Internet, and other media on request. On-line access via Worldwide Web (URL address above), FTP access possible on request.

Publications: TerraFlops

Special Projects: Running the climate model part of the **IPCC DDC**: The Data Distribution Centre (DDC) of the Intergo vernmental Panel on Climate Change (IPCC) facilitates the timely distribution of a consistent set of up-to-date scenarios of changes in climate and related environmental and socio-economic factors.

World Data Center for Glaciology, Boulder

Dr Roger G. Barry, Director WDC for Glaciology CIRES, Campus Box 449 University of Colorado BOULDER CO 80309 U.S.A. Tel: +1 303 492 6199 Fax: +1 303 492 2468 Internet: nsidc@kyros.colorado.edu

Maintained by: Operated under a cooperative agreement between the University of Colorado, Cooperative Institute for Research in Environmental Sciences (CIRES), and the National Oceanic Atmospheric Administration (NOAA). The WDC for Glaciology, Boulder is collocated with the National Snow and Ice Data Center (NSIDC).

Summary of Data Held: Digital data on numerous forms of snow and ice research including snow depth and extent; sea ice extent and concentration; ice cores; passive microwave data; freshwater ice. Other data holdings include imagery, an historical glacier photograph collection, and published information relating to all aspects of snow, ice, and permafrost research.

User Services: Located at 1540 30th Street, Boulder, Colorado. The WDC for Glaciology, Boulder is open to visitors during normal working hours. Data copying, processing and analysis are available through in-house computers and image analysis capabilities. Literature searches on any topic can be performed on CITATION, the in-house on-line bibliographic data bank. Mail and telephone queries are welcome.

Publications: Quarterly accessions list, bibliographies, inventories, data reports in Glaciological Data series. Data announcements describing individual data sets held by the WDC USA are available on request.

World Data Center for Marine Environmental Sciences Biogeochemistry, Circulation, and Life of Present and Past Oceans, Bremen

Prof. Dr. Gerold Wefer, Director Prof. Dr. Wolfgang Hiller, Co-Director Dr. Michael Diepenbroek, Managing Director Dr. Hannes Grobe, Data management Centre for Marine Environmental Sciences Klagenfurter Str D - 28359 Bremen Germany Tel: ++49 421 218-3389 Fax: ++49 421 218-3116 Internet: info@wdc-mare.org WWW Home Page. http://www.wdc-mare.org/

Maintained by: The Centre for Marine Environmental Sciences (MARUM) at Bremen University and Foundation Alfred Wegener Institute for Polar and Marine Research (AWI).

Summary of Data Held: The WDC is aimed at collecting, scrutinizing, and disseminating data related to global change in the fields of environmental oceanography, marine geology, paleoceanography, and marine biology. It focuses on georeferenced data using the information system PANGAEA. The WDC stores and handles numeric, string, and image data. Users can retrieve data through the Internet via different gateways. Data are accepted in any format.

User Services: The WDC for Marine Environmental Sciences offers data management services, in particular project data management and data publication. It maintains an inventory of site and sampling locations for all related fields. It provides hosting and mirroring of electronic journals and serves software products for analyzing, visualization, and transformation of data. Visitors are welcome.

World Data Center for Marine Geology and Geophysics, Boulder

Dr George Sharman, Director WDC for Marine Geology and Geophysics NOAA/NGDC Code E/GC3 325 Broadway BOULDER CO 80303 U.S.A. Tel: +1 303 497 6345 Fax: +1 303 497 6513 Internet: wdcmgg@noaa.gov WWW Home Page: http://www.ngdc.noaa.gov/mgg/wdcmgg

Maintained by: U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). The WDC for Marine Geology and Geophysics, Boulder is operated by, and collocated with, the National Geophysical Data Center (NGDC).

Summary of Data Held: WDC for MGG, Boulder manages all types of data from the ocean floor including descriptions and analyses of seafloor samples, deep drilling data, underway geophysical measurements, and derived gridded data sets including total sediment thickness of the world oceans. Other data types include coastlines and plate boundaries.

Geophysical data include bathymetry, gravity, and magnetics, and single- channel and multichannel sub-bottom profiles collected on more than 4,000 oceanographic surveys covering millions of km from the world's oceans. Bathymetric data include i) underway bathymetric measurements (including multibeam data); ii) gridded bathymetric data for the world's oceans based on compilations by the U.S. Naval Oceanographic Office and; iii) hydrographic sounding in U.S. waters. WDC for MGG also offers gridded total sediment thickness data from ocean basins and sidescan sonar image data.

Geologic data are available for over one hundred thousand cores, grabs, dredges, and drill samples covering most of the world's oceans. Data include i) faunal counts; ii) geochemical measurements such as carbon and isotope data, trace metal analyses of sediment, and majorelement analyses of rocks; iii) physical properties of sediment, including particle size and geotechnical properties such as vane shear and density; iv) visual descriptions; v) paleomagnetics; vi) downhole logging data and; vii) marine minerals data.

Data are contributed by sources from around the world and were originally collected for a variety of purposes, including academic research, international and interdisciplinary scientific projects, commercial mineral resource evaluations, defense, and government environmental baseline studies.

User Services: The WDC for MGG is located in the David Skaggs Building at 325 Broadway, Boulder, Colorado. Visitors are welcome during normal working hours; advance notice is recommended. A visiting scientist program exists. Data processing, copying and analysis facilities are available. Data are available on most media including CD-ROM, via Internet, and other media on request. On-line access via Worldwide Web (URL address above), Gopher (gopher.ngdc.noaa.gov) and anonymous FTP (ftp.ngdc.noaa.gov). Login for FTP access is userid: anonymous, and password: your full e-mail address. WDC for MGG inventories are fully searchable via the WWW and many CD-ROM and other databases are available for on-line searching and data download.

Publications: WDC for MGG publication series color images, data reports, and scientific reports of interest to the MGG community.

Special Projects: WDC for MGG participates in the Intergovernmental Oceanographic Commission (IOC) technical committee on International Oceanographic Data and Information Exchange (IODE), the General Bathymetric Chart of the Oceans (GEBCO), regional IOC mapping projects, and cooperates extensively with the International Ocean Drilling Program (ODP), for which it operates a parallel data archive.

World Data Center for Meteorology, Asheville

Mr August L. Shumbera, Director WDC for Meteorology Federal Building Fax: +1 828 271 4246 151 Patton Ave. ASHEVILLE NC 288015001 U.S.A. Tel: +1 828 271 4445 Tel: +1 828 271 4445 Tel: +1 828 271 4800 Internet: wdcamet@noaa.gov WWW Home Page: http://www.ncdc.noaa.gov/wdcamet.html

Maintained by: U.S. Department of Commerce, National Oceanic and Atmosphere Administration (NOAA). The WDC for Meteorology, Asheville is operated by, and collocated with, the National Climatic Data Center (NCDC).

- **Summary of Data Held:** Various data sets and from international programs and experiments, including meteorological and nuclear radiation data for International Geophysical Year (see IGY Annals Vol. 26); Global Atmospheric Research Program, World Climate Research Program, World Climate Research Program, World Climate Research Program, and data exchanged with WDC-USA by participating countries.
- International Geophysical Year (IGY). Global meteorological and nuclear radiation data and data products, 1957-1958.
- International Quiet Sun Year (IQSY). Global meteorological data and data products, 1964-1965.
- Global Atmospheric Research Program (GARP):
- GARP Atlantic Tropical Experiment (GATE) 1974; First GARP Global
- Experiment (FGGE) 1978-1979; Winter and Summer Monsoon Experiments
- (WMONEX, SMONEX) for 4-month periods within FGGE; Alpine Experiment (ALPEX) for 2-month period in 1982.
- The World Climate Research Program (WCRP):
- International Satellite Cloud Climatology Project (ISCCP). Global analyses of satellite radiance measurements, 1982-2000. Data products are archived at ISCCP Central Archive and are available from WDC-USA.
- Tropical Ocean Global Atmosphere (TOGA) for specified ocean area, 1985-1994; TOGA Coupled Ocean-Atmosphere Response Experiment for a 12-month period in 1992-1993, including a 4-month intensive campaign in the Western Pacific. Global Precipitation Climatology Project (GPCP). Monthly precipitation data from surface, radar and satellite measurements for 1986 onwards. World Climate Data and Monitoring Program (WCDMP). Baseline Data sets prepared in cooperation with WMO, WDCB and WDCD and exchanges with participating countries. Global Historical Climate Network (GHCN). Comprehensive monthly global baseline climate data set of temperature, precipitation, and pressure. The earliest record dates from 1697. Comprehensive OceanAtmosphere Dataset (COADS) from ships and buoys, some dating from the 1850s. Comprehensive

Aerological Reference Dataset (CARDS) from radiosondes and rawinsondes, and station histories, 1948-1995.

- High altitude rocketsonde data for 1959-1976.
- Ozone Data for the World from 1965, Atmospheric Environment Service, Department of the Environment, Canada, in cooperation with WMO.
- Solar Radiation and Radiation Balance Data from World Radiation Data Center, St. Petersburg, Russia, in cooperation with WMO, from 1964. Synoptic Data for surface and upper air observations, daily and monthly summaries, some in computer form, from countries participating in data exchange activities with WDC-USA.

User Services: Open to visitors during normal working hours. Advance notice is recommended. Facilities include computers, microfilm and microfiche readers, printers and copiers. Services include data and map reproduction, statistical analysis, library searches, certification of records. Referral service for data not held by WDC-USA. Visiting scientists may be supported by parent organizations, WMO training programs, or grants from U.S. National Research Council.

Publications: Monthly Climatic Data for the World, monthly in cooperation with WMO, including climate data from World Weather Watch Program. *1961-1990 Global Standard Climate Normals* in cooperation with WMO.

World Data Center for Oceanography, Silver Spring

Mr Sydney Levitus, Director WDC for Oceanography NOAA/NODC E/OC5 1315 East-West Highway SILVER SPRING MD 20910-3282 U.S.A. Tel: +1 301 713 3294 Fax: +1 301 713 3303 Internet: slevitus@nodc.noaa.gov *WWW Home Page:* http://www.nodc.noaa.gov/General/NODC-dataexch/NODC-wdca.html

Maintained by: U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). The WDC for Oceanography, Silver Springs is operated by, and collocated with, the National Oceanographic Data Center (NODC).

Summary of Data Held: A variety of oceanographic sets, collected during international projects and routine observational programs. Examples are:

• International Geophysical Year: IGY and IGC oceanographic data 1957-1959. International projects:

• Data from the Tropical Atlantic (ICITA), Indian Ocean (IIOE) Programs, and the first GARP Global Experiment (FGGE). Data sets from Climate Research Programs (TOGA, WOCE, and JGOFS).

Routine observations:

• Data from fixed stations and ship cruises since 1900; Nansen cast and salinity/temperature/depth (STD/CTD) data, bathythermo-graph data, biological data, current measurements.

User Services: Open to visitors during normal working hours. Advance notice is recommended. NODC data processing facilities and data management services are available to users of the WDC-USA.

Data Publications: Annual reports of Oceanographic Data Exchange data catalog to 1975, with Change Notices from 1975 onward; Accessioned Publications, 1957-1967 with biennial supplements; data reports and special catalogs for international oceanographic programs.

Data Products: Time Series Data Sets for the World's Oceans. Responsible National Oceanographic Data Center (RNODC) data sets for Integrated Global Ocean Services System (IGOSS), FGGE operational year, Drifting Buoy Data, Southern Oceans WOCEUpper Ocean Thermal Data Set, World Ocean Atlas 1994 (atlases and CDs), Atlas of Surface Marine Data 1994 (atlases and CDs).

World Data Center for Paleoclimatology, Boulder

Dr. C. Mark Eakin, Director WDC for Paleoclimatology NOAA/NGDC Code E/GC4 325 Broadway BOULDER CO 80303 U.S.A. Tel: +1 303 497 6160 Fax: +1 303 497 6513 Internet: NCDC.Paleo@noaa.gov WWW Home Page: http://www.ngdc.noaa.gov/paleo/paleo.html

Maintained by: U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). The WDC for Paleoclimatology, Boulder is operated by, and collocated with, the National Geophysical Data Center (NGDC).

Summary of Data Held: Estimates of past environments derived from tree rings, ice cores, marine and lake sediments, etc. Most data are for the Quaternary (the past 700,000 years), some for earlier climates. Archives include the raw data used to reconstruct climate variables. Examples include:

- Tree rings Time series of ring-width and wood density, climate reconstructions. Global distribution, spanning 10,000 years BP.
- Ocean Sediments: Geochemical measurements (Cd/Ca, 14C, C and O isotopes), counts of fossil plankton, and estimates of temperature, salinity, ocean circulation. Global distribution, spanning 500,000 yr BP.
- Lake and Mire Sediments: Sediment accumulation, geochemical measure-ments, pollen and plankton, reconstructions of vegetation, precipitation, lake levels, temperatures, etc. Global distribution, spanning 20,000 yr BP.
- Ice Cores: Aerosols, stable isotopes, atmospheric trace-gas content, etc. Global distribution, spanning 300,000 yr BP.
- Corals: Geochemical analyses of banded corals. Distribution: tropical oceans, spanning the last several hundred years BP.
- Climate Forcing and Boundary Conditions: Volcanic aerosols, solar variability, insolation, ice volume, sea level, land surface albedo, atmospheric trace gas content. Global distribution, spanning 5,000,000 BP.
- Numerical Model Simulations: Input and results from computer climate model simulations for specific intervals and model sensitivity experiments to examine the role of climate forcing. Global distribution, spanning 20,000 yr BP and older intervals.
- Climate Reconstructions: Raw and gridded map reconstructions of sea level, vegetation, albedo, temperature, precipitation, circulation patterns. Global distribution, spanning 20,000 yr BP, older intervals including the last interglacial, 126,000 yr BP).

User Services: The WDC for Paleoclimatology is located in the David Skaggs Building at 325 Broadway, Boulder, Colorado. Visitors are welcome during normal working hours; advance notice is recommended. A visiting scientist program exists. Data processing, copying and analysis facilities are available. Data are available on most media including CD-ROM, via

Internet, and other media on request. On-line access via Worldwide Web (URL address above) and anonymous FTP (ftp.ngdc.noaa.gov). Login for FTP access is userid: anonymous, and password: your full e-mail address.

Publications: The Paleoclimate Data Record.

Special Projects: Past Global Changes (PAGES), an International Geosphere Biosphere Program Core Project, is distributing data via the WDC-USA. The Paleoclimate Model Intercomparison Project, sponsored by NATO, will compare numerical climate model simulations for different geological eras. Data from this project will be archived at and distributed via the WDC-USA.

World Data Center for Satellite Information, Greenbelt

Mr. Donald M. Sawyer, Acting Director WDC for Satellite Information NSSDC Code 633 NASA Goddard Space Flight Center GREENBELT MD 20771 U.S.A. Tel: +1 301 286 6695 Fax: +1 301 286 1771 Internet: request@nssdca.gsfc.nasa.gov Worldwide Web: http://nssdc.gsfc.nasa.gov/about/about_wdc-a.html

Maintained by: U.S. National Aeronautics and Space Administration, Goddard Space Flight Center (GSFC). The WDC for Satellite Information, Greenbelt is operated by, and collocated with, the National Space Science Data Center (NSSDC).

Summary of Data Held: Information about rocket, satellite, and space probe launches (information on current rocket launches is no longer maintained); satellite orbit elements and ephemerides; descriptions of spacecraft and experiments. NSSDC holds many data from NASA space science spacecraft, accessible to nonU.S. users in off-line form (CDROMs and tapes) by requests directed to the Request Coordination Office of WDCARandS. Some NSSDC holdings are accessible electronically.

User Services: Open to visitors during normal working hours (advance notification recommended). Disseminates spacecraft launch information with newly assigned international identifiers within days of launches. Forwards international data requests for NSSDCheld data. On-line information about NSSDC data holdings may be obtained via WWW http://nssdc.gsfc.nasa.gov, which links to NASA Master Directory and other data and services.

Publications: SPACEWARN Bulletin which summarizes spacecraft launches monthly (also at http://nssdc.gsfc.nasa.gov/spacewarn/spacewarn.html); detailed catalogs of NSSDC data holdings; data books and CDROMs for selected NSSDC data.

Principles and Responsibilities of ICSU World Data Centers

The basic principles and responsibilities of the international exchange of solar, geophysical and environmental data through the World Data Centers have carried forward under ICSU rules, essentially unchanged since the establishment of the WDC system for the IGY.

- 1. World Data Centers are operated for the benefit of the international scientific community. They are supported by national organizations according to these Principles laid down by the ICSU Panel on World Data Centres.
- 2. The resources required to operate WDCs are the responsibility of the host country or institution, which is expected to provide these resources on a long-term basis. If for any reason a WDC is closed, the data holdings shall be transferred to another WDC.
- 3. WDCs will, subject to their financial resources, accept data according to the data management plans of appropriate ICSU scientific programs or monitoring activities, and store these data safely and in good condition. WDCs may enhance their holdings by seeking and collecting related data sets. They may prepare higher-order data products such as indices of activity and collated or condensed data sets.
- 4. WDCs will prepare and publish catalogs of their data holdings, or otherwise make freely available information on their holdings, e.g., by electronic access.
- 5. WDCs will exchange data among themselves, as mutually agreed and whenever possible without charge, to facilitate data availability, to provide back-up copies, and to aid the preparation of higher-order data products.
- 6. No confidential or security-classified data are to be held in a WDC.
- 7. Data may be subject to privileged use by their originators, for a period to be agreed beforehand, and not to exceed two years from the date of acquisition by the WDC.
- 8. WDCs will provide data to scientists in any country free of charge, on an exchange basis or at a cost not to exceed the cost of copying and sending the requested data. Additional charges may be made for special services, or for acquiring data from outside the WDC system.
- 9. WDCs will accept any scientist as a visitor to work on site with data holdings held under WDC auspices.
- 10. WDCs will report to the ICSU Panel as requested.



World Data Centers