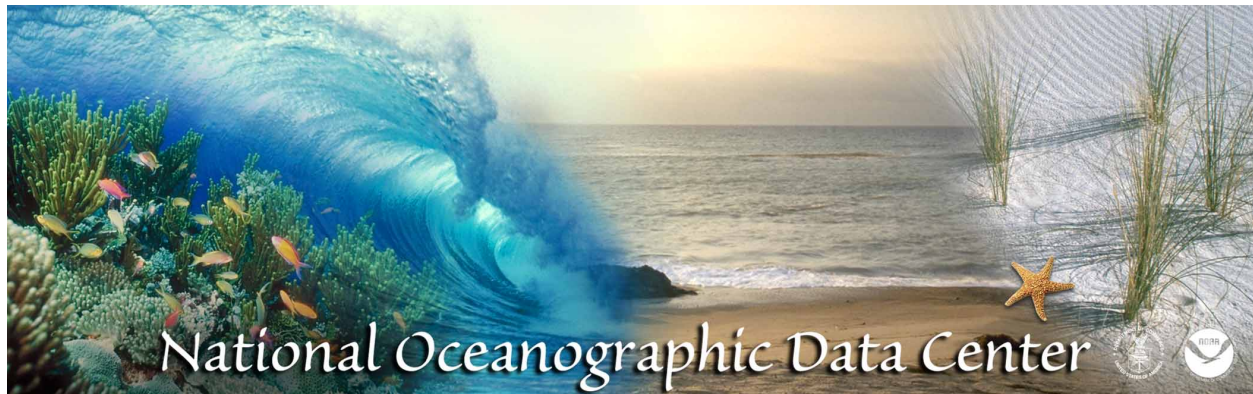




The National Oceanographic Data Center is the nation's archive and distribution center for U.S. coastal and global ocean data. It supports the strategic goals of the U.S. Department of Commerce and the National Oceanic and Atmospheric Administration.

NODC Annual Report FY2000



Oceanographic Data and Information Services

The National Oceanographic Data Center (NODC) manages the world's largest collection of publicly available oceanographic data. The NODC holdings include *in situ* and remotely-sensed physical, chemical, and biological oceanographic data from coastal and deep ocean areas. NODC holdings currently contain more than a terabyte of data extending back one hundred years. The volume is expected to grow exponentially as new ocean observing systems are deployed.

Through the archive and access services of NODC, these data are being reused to answer questions about climate change, ocean phenomena, management of coastal and marine resources, marine transportation, and natural disasters. Another significant user community is in education, where these data and information products help teach each new generation of students about the oceans.

In FY2000, NODC implemented a major redesign of its entire website and added some important new applications. Users can now go directly to online data in their area of interest, without regard to NODC organizational structure. The new website incorporates a feedback link on most subpages to encourage users to contact NODC with navigation problems, suggestions, and general comments. A "Data Applications" system has also been implemented so that customers may provide details about how they use the data they download from NODC. The new design conforms more closely with the principles of the FirstGov Federal web portal, as well as with the user accessibility goals of NESDIS and NOAA.

NESDIS/NODC
October 1, 2000

Direct Access to NODC Archives

The NODC digital archive contains *in situ* oceanographic data submitted by ocean researchers. Previously, NODC patrons requesting data from the archive had to contact NODC via phone or email, and NODC personnel had to retrieve and deliver the data. Now, all of NODC's archived digital data is available through a new online system called NODC Direct. Users can select data and have the data sets delivered by FTP. In the near future, users will be able to create more advanced queries, and select data using new technology developed within the National Virtual Data System (NVDS) project.

<http://www.nodc.noaa.gov/col/projects/access/nodcdirect.html>



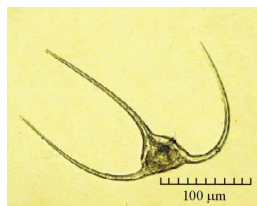
Ocean Atlases

NODC produces special products and analyses from its data holdings. Perhaps the best known examples are the **World Ocean Database (WOD)** and the **World Ocean Atlas (WOA)**. These products, available online or as CD-ROMs, provide a consistently formatted resource of ocean profile data, with objective quality control applied. Version 2 of the latest **WOD** includes temperature, salinity, oxygen, plankton, pigment and nutrient data. The *Atlas* presents statistical summaries and gridded fields of these parameters on a monthly, seasonal, and annual basis from the 1940's through 1998. **WOA Figures** are now also available on the NODC website and on CD-ROM.

http://www.nodc.noaa.gov/OC5/pr_wodv2.html

http://www.nodc.noaa.gov/OC5/pr_woaf.html

Another Important new product is the **Biological Atlas of the Arctic Seas 2000: Plankton of the Barents and Kara Seas**. This atlas describes both the climatological and decadal distribution of plankton data in these seas, which are known to have undergone climate shifts in physical variables (e.g., temperature) during this century.



World Ocean Circulation Experiment

NODC continued its support of the World Ocean Circulation Experiment (WOCE), serving as the Upper Ocean Thermal Data Assembly Center, and publishing Version 2 of the data sets on CD-ROM. WOCE, a part of the World Climate Research Programme (WCRP), combined resources from nearly 30 countries to make unprecedented *in situ* and satellite observations of the global ocean between 1990 and 1998.

The main goal of WOCE is to observe poorly understood, but important physical processes in an attempt to study the large scale circulation of the ocean. These CDs will serve as a unique resource for climate researchers and marine scientists for decades to come. All CDs are designed to be accessed using an Internet browser.



<http://www.nodc.noaa.gov/General/NODC-cdroms.html#woce>
<http://www.cms.udel.edu/woce>

Earth System Monitor

NOAA's *Earth System Monitor* began its tenth year of publication with a subscription list of over 3000. This quarterly publication reports on NOAA products and services to educate the public as well as program managers in other agencies and institutions. NODC staff edits and publishes the *Earth System Monitor* and has recently placed back issues online for public search and access.

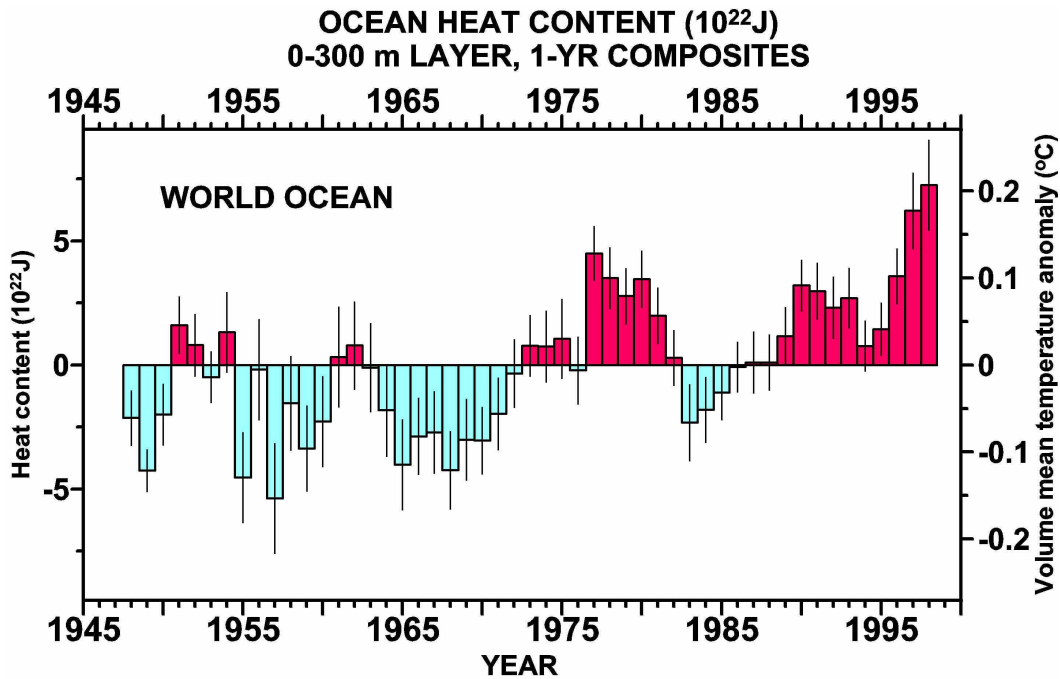
<http://www.nodc.noaa.gov/General/NODCPubs/>

New Coastal Center



As part of the FY 2000 appropriation process, Congress provided funding to establish the National Coastal Data Development Center (NCDDC) at Bay St. Louis, Mississippi. The NCDDC will be a National Center that provides for the archive of, and access to, the long-term coastal data record. NCDDC will work closely with many of the federal, state, and local agencies, academic institutions, and the private sector to create a unified, long-term archive for coastal data sets.

As part of the FY 2000 appropriation process,



Warming of the Oceans

NODC's Ocean Climate Laboratory announced that the world ocean has warmed significantly over the past 40 years, based on analysis of *in situ* observations. Sydney Levitus, who heads the Ocean Climate Laboratory, reported the findings in the March 24, 2000 issue of *Science* magazine in an article, ***Warming of the World Ocean***. Media interest was extremely high, and articles appeared in newspapers throughout the country including the NY Times, Washington Post, and San Francisco Chronicle. Radio and television coverage by CBS News, CNN World News, National Public Radio, and a number of local radio stations also carried the announcement. [see graph above]

Levitus, S., J. Antonov, T.P. Boyer, C. Stephens, 2000, Warming of the World Ocean. *Science*, 287, 2225-2229.

Security

Providing online access to the public comes with increased security risk. NODC Information Technology staff have implemented improved "firewall" systems based on non-proprietary hardware and software that handle greater volumes of traffic at less cost, with reduced risk. This work has become a model for other NOAA installations.

Archive

NODC has established redundant data holdings in conformance with the National Archive and Records Administration (NARA) archive management policies. One copy of the data, in original form, is stored in off-site storage as the preservation copy, and a working copy provides service access. NODC also installed an IBM 3590 tape transport system to conform to the NNDC media storage standard. To assure the integrity of the NODC archive data sets, MD5 Checksum values are computed and used to validate all future copies. Also, to mitigate risk to the data, NODC has implemented virus scanning procedures for all incoming data.

Library Services

On March 30, 2000, Librarian of Congress, Dr. James Billington, presented the 1999 Federal Library of the Year Award to the NOAA Central Library staff. The Department of Commerce Aquaculture Initiative, funded through the NOAA Strategic Plan - Build Sustainable Fisheries, included the NOAA Central Library as an integral part of the outreach program. A new Aquaculture Information Clearing House will be housed at the Library which will include staffing, a website, supporting documents, and international dissemination of aquaculture information. The NOAA Photo Collection (compiled by the NOAA Central Library) increased its online photos to 16,000, and has been an enormous success over the past few years. <http://www.lib.noaa.gov>

International

Joint Global Ocean Flux Study (JGOFS) - The JGOFS Data Management Task Team (DMTT), chaired by Margarita Conkright, met in Kiel, Germany this summer, to discuss present and future activities of the DMTT. The DMTT members presented the status of JGOFS data for their countries, current activities related to JGOFS and JGOFS-related data management, and future plans. An article describing this meeting was published in U.S. JGOFS News 10(4)14-15.

<http://ads.smr.uib.no/jgofs/jgofs.htm>

International Council for the Exploration of the Sea (ICES) - Robert D. Gelfeld serves as Chairman of the ICES Working Group on Marine Data Management.

The Working Group provides a forum for the exchange of expertise and ideas for those involved in marine data management in the 19 ICES Member Countries. During the past year the Group was involved in the setting of standards for the quality assurance and exchange of oceanographic data, and monitoring and encouraging the flow of data to the ICES Oceanographic Data Bank and other international centers.

<http://www.ices.dk/committe/occ/mdm/>

World Ocean Circulation Experiment (WOCE) - Kurt Schnebele and Charles Sun attended the WOCE Data Products Committee's (DPC) meeting in April 2000. The meeting defined the format of the WOCE Global Data CD-ROM version 2.0, and considered how the WOCE data will make the transition from the Data Assembly Centers (DACs) to a permanent archive. NODC is the DAC for upper ocean thermal data.

<http://www.soc.soton.ac.uk/GDD/hydro/nph/dpc13/>

<http://www.cms.udel.edu/woce>

NODC Published Articles

- 1) Boyer, T. P., M. E. Conkright, and S. Levitus, 1999. Seasonal variability of dissolved oxygen and percent oxygen saturation in the Atlantic and Pacific Oceans. *Deep-Sea Res.*, 46, 1593-1613.
- 2) Matishov, G. G., V. V. Denisov, A. N. Zuyev, V. A. Golubev, N.M. Adrov, S. Levitus, I.V. Smolyar, 1999. Climatic Atlas of the Barents Sea. *Doklady Earth Sciences (English translation of Doklady Akademii Nauk, Russia)*, 366 (5), 692-694.
- 3) Conkright, M. E., W. W. Gregg, and S. Levitus, 2000. Seasonal cycle of phosphate in the world ocean. *Deep-Sea Res.*, 47, 159-175.
- 4) Jones, C. S., J. F. Shriver, and J. J. O'Brien, 2000. The effects of El Nino on rainfall and fire in Florida. *The Florida Geographer*, 30 55-69.

- 5) Levitus, S., J. Antonov, T.P. Boyer, C. Stephens, 2000. Warming of the World Ocean. *Science*, 287, 2225-2229.
- 6) Loukos, H., F. Vivier, P. P. Murphy, D. E. Harrison, C. Le Quere, 2000. Interannual variability of equatorial Pacific CO₂ fluxes estimated from temperature and salinity data. *Geophys. Res. Lett.*, 27, 1735.
- 7) Sun, L.C., S. S. Niou, 2000. Building the Web-based Time Series Database at the U.S. National Oceanographic Data Center. *Eos, Trans. Am. Geophys. Un.*, 81(19), S282

FY 2001 Plan

- Complete World Ocean Database 2001, adding approximately 300,000 new temperature profiles.
- Provide web accessibility to Harmful Algal Bloom data sets.
- Complete enhancements to Global Temperature Salinity Profile Program (GTSP) database.
- Initiate the DOC Aquaculture Information Center, which is part of the Implementation plan of the DOC Aquaculture Policy.
- Implement the National Coastal Data Development Center (NCDDC), and host the Center dedication.
- Complete evaluation of the NCDDC prototype Information Technology architecture, including the distributed object computing-based Data Exchange Infrastructure.
- Migrate NODC Archive to standard NOAA/NESDIS media.

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