INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

Seventeenth Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE-XVII)
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IODE NATIONAL REPORT FOR UNITED STATES OF AMERICA
1. **Name of Data Centre:**
   U.S. National Oceanographic Data Centre

2. **National IODE Coordinator:**
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3. **Data Centre Address:**
   As above

4. **Data Centre URL:**
   [http://www.nodc.noaa.gov](http://www.nodc.noaa.gov)

5. **IODE Data Centre Designation Date:**
   1961

   The U.S. National Oceanographic Data Center (NODC) holds the world's largest collection of publicly available oceanographic data. The main NODC facility is located in Silver Spring, Maryland. The NODC also has field offices collocated with major government or academic oceanographic laboratories in Stennis Space Center, MS; Miami, FL; La Jolla, CA; Seattle, WA, and Honolulu, HI. The NODC also operates World Data Center for Oceanography, Silver Spring, Maryland.
   The NODC is one of the national data centers within the:
   - National Environmental Satellite, Data, and Information Service (NESDIS)
   - National Oceanic and Atmospheric Administration (NOAA)
   - U.S. Department of Commerce

   The NODC also manages the NOAA Library and Information Network ([http://www.lib.noaa.gov/docs/windandsea.html](http://www.lib.noaa.gov/docs/windandsea.html)) which includes the NOAA Central Library in Silver Spring, Maryland; regional libraries in Miami, Florida and Seattle, Washington; and field libraries or information centers at about 30 NOAA sites throughout the United States. The combined libraries contain more than 1 million volumes, including books, journals, data and information CD-ROMs, and audio and video tapes.

7. **Brief History**
   The NODC was established in January 16, 1961. The first home of the NODC was located in Washington, D.C. as part of the U.S. Navy. The original NODC was created to receive, compile, process and preserve global oceanographic data. In October 1970 NODC was transferred from the U.S. Navy to the newly formed National Oceanic and Atmospheric Administration (NOAA).

   It became part of the Environmental Data Service (EDS) where it joined two other data centers, the National climatic Data Center and the National Geophysical and Solar-Terrestrial Data Center. EDS was the Government’s first major line organization created specifically to manage environmental data. Its mission was to acquire, process, analyze, and disseminate worldwide environmental information, data, and products to all concerned. It was also to undertake applied research, to improve services, to
provide facilities for the World Data Center System, to coordinate international activities, and to provide editorial, publishing, library and information services.

8. Roles and Responsibilities of the Data Centre:

The NODC holds physical, chemical, and biological oceanographic data collected by U.S. Federal agencies, including the Department of Defense (primarily the U.S. Navy); State, and local government agencies; universities and research institutions; and private industry. NODC does not conduct any data collection programs of its own; it serves solely as a repository and dissemination facility for data collected by others. The NODC provides data management support for major ocean science projects such as TOGA (Tropical Ocean Global Atmosphere), WOCE (World Ocean Circulation Experiment), GTSPP (Global Temperature-Salinity Profile Project), JGOFS (Joint Global Ocean Flux Study) and support of operational ocean monitoring (e.g. Argo). NODC provides customers with access to global databases of physical, chemical, and biological ocean data, as well as to numerous individual data sets and data products.

The NODC holds data from the ocean water column extending from the sea surface to the sea floor. Marine geological and geophysical data such as sediment data, bathymetry data, or underwater gravity or magnetics data are held by the NOAA National Geophysical Data Center (NGDC), Boulder, Colorado. Although the NODC holds some surface marine meteorological data, weather and climate data are primarily the responsibility of the NOAA National Climatic Data Center (NCDC), Asheville, North Carolina. Finally, glaciological data are held by the National Snow and Ice Data Center (NSIDC) which is operated for the NGDC by the Cooperative Institute for Research in the Environmental Sciences, University of Colorado, Boulder.

International Activities (http://www.nodc.noaa.gov/General/NODC-dataexch/):

The U.S. NODC participates in international oceanographic data exchange activities that help fulfill its mission. Cooperation with international organizations and with foreign data centers has enabled the NODC to augment its data holdings with valuable foreign data collected worldwide and to ensure that U.S. oceanographic data are available to the global ocean community.

The NODC provides facilities and support for the collocated World Data Center for Oceanography (WDC), one component of the World Data System. The World Data Center System is a network of discipline sub-centers operating under the guidance of the International Council of Scientific Unions (ICSU). There are two other World Data Centers for Oceanography: WDC for Oceanography in Obninsk, Russia, and WDC for Oceanography in Tianjin, Peoples Republic of China.

The NODC serves as the U.S. focal point for data exchange activities conducted under the purview of the Working Committee on International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC), a subsidiary body within the United Nations Educational, Scientific, and Cultural Organization. The NODC also supports oceanographic data exchange through participation with the International Council for the Exploration of the Seas (ICES).

When it was established in 1961, the U.S. NODC was the first such organization in the world. Today there are oceanographic data centers and similar organizations in over 40 countries. In addition to data exchanges carried out through international organizations, the NODC also conducts bilateral data exchanges with data centers in dozens of countries.

9. Data Centre Projects and Activities during the Intersessional Period:

Data/information products (http://www.nodc.noaa.gov/General/getdata.html)

NODC Web pages include detailed information about NODC CD-ROM products as well as an online order form where they can be ordered.

Data holdings (digital) (http://www.nodc.noaa.gov/General/parameters.html)

Selected NODC data are available online via the NODC Web site. Major collections of NODC data are also available on CD-ROM.

NOAA Marine Environmental Buoy Database (http://www.nodc.noaa.gov/BUOY/buoy.html)
• The Environmental Buoy Data Oceanographic and marine meteorological data from NOAA buoys and coastal stations;

**Sea Level Data** ([link](http://www.nodc.noaa.gov/General/sealevel.html))

• Time series of hourly, daily, and monthly values of sea level from stations primarily in the tropical and subtropical oceans;

**Ocean Current Data** ([link](http://www.nodc.noaa.gov/General/current.html))

• Surface and subsurface current data from current meters, current drifters, ADCP instruments, or other methods;

**Satellite Data** ([link](http://www.nodc.noaa.gov/General/satellite.html#nodcsat))

• Ocean remote sensing data and products from missions such Geosat and TOPEX/POSEIDON
• Sea surface temperature analyses and other products for U.S. coastal regions derived from AVHRR data collected by polar-orbiting satellites;

**Individual data sets** ([link](http://www.nodc.noaa.gov) - link to NODC direct)

• Data sets stored in originator formats (usually for small areas/time periods)

**Publications** ([link](http://www.nodc.noaa.gov/General/NODCPubs/)):
The NODC publishes technical reports, data inventories, and related publications. Many older publications that are now out of stock at the NODC are still available from the National Technical Information Service (NTIS). A complete list of all the NODC publications that are still available, either from the NODC or the NTIS, is available on request from the NODC.

**Exchange media** ([link](http://www.nodc.noaa.gov/General/getdata.html)):

Each year the NODC responds to thousands of requests for oceanographic data and information. Copies of specified data sets or data selected from the NODC’s archive databases can be provided on magnetic media or on CD-ROM. Moderately sized data sets can also be transmitted over computer networks via ftp. NODC data products are provided at prices set in accordance with Department of Commerce and NOAA policy guidelines.

10. **Data Centre Products and Services Developed and/or made available during the Intersessional Period:**

**The National Coastal Data Development Center (NCDDC)** ([link](http://www.ncddc.noaa.gov)) - April 2002

NCDDC provides access and archive to coastal data and information using: web enabled search technologies, metadata construction tools, data provider gateways, middleware access and format translators, and geospatial information display techniques. The coastal data center services include: data cataloging and mining, assessment, quality control, integration, and new product development support for a customer base that spans federal, state, local agencies, academic institutions and the public. Information services are developed through a series of ongoing projects that include: **Coastal Risk Atlas**-online Hazard Vulnerability Assessment Tool linked to census, terrain, and coastal data bases to predict man-made and natural disaster outcomes; **Harmful Algal Blooms Observing System**-web enabled tracking, detection and forecast for red tides and other bloom events; **Hypoxia**-similar to HABSOS with a focus on reduced oxygen areas in coastal environments; **Marine Invasive Species**-online alert tool for identifying, reporting, and mapping nuisance species; **Ecosystem Habitat Management System**-fisheries data system with online, search, access, and mapping tools; **Integrated Ocean Observing System**-federated data management network linked to real time marine observing platforms; and **Ocean Exploration**- transition of unique shipboard data to public web site for data access, mapping and display. The center partners with activities within NOAA; NOS, NMFS, NWS and outside of NOAA; EPA, USGS, USACE, Navy, and numerous universities and state agencies, that are focused on coastal processes and information.

World Ocean Database 2001 (WOD01) is comprised of 8 CD-ROMs and contains in situ profile data such as temperature, salinity, nutrients, oxygen, chlorophyll, plankton biomass data and more. It is an update to the World Ocean Database 1998, plus it contains some new parameters.

Some changes since WOD98:

- addition and specification of data from undulating oceanographic recorders, profiling floats, drifting buoys, moored buoys, surface only data, and autonomous pinniped
- bathythermograph data.
- addition of carbon variables to the database.
- submittor defined data quality flags received as part of data submissions are now kept in the database.
- modifications to the format.

To help visualize the data files, the CD-ROMs come with Ocean Data View © software developed by R. Schlitzer, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany. An online version of WOD01 is also available for downloading individual data files, and the WOD01 webpage provides extensive documentation.

NODC Satellite Oceanography Group (http://www.nodc.noaa.gov/sog) - October 2002

The mission of the NODC Satellite Oceanography Group is to provide authoritative long-term records primarily from satellite data and to use those datasets to document variability in Earth's oceanic systems. These activities fall within the concept of scientific data stewardship and include numerous projects which seek to develop and deploy community consensus algorithms for creating consistent, accurate, stable, and climate-capable geophysical ocean parameters from space. Examples of these projects include an AVHRR (Advanced Very High Resolution Radiometer) reanalysis effort with the University of Miami to create a twice-daily global sea surface temperature (SST) product at 4 km resolution spanning 1985 to present. This effort will result in over 10 TB of data at both high spatial and temporal resolutions. Another example is the NODC effort as part of the NOAA Coral ReefWatch program to document conditions for coral reef bleaching using a multi-sensor approach which classifies insolation, SST, and wind speeds to identify likely bleaching periods and locations. A third area in which the NODC Satellite Oceanography Group has been active is the GODAE (Global Ocean Data Assimilation Experiment) High-Resolution SST Pilot Project, an international activity geared toward delivery in near real time of global, cloud-free SST fields with approximately 4 km resolution using multi-sensor, multi-platform data fusion techniques.

NOAA Coral Reef Information System (CoRIS) (www.coris.noaa.gov) - September 2002

In response to a major objective in the U.S. Coral Reef Task Force’s National Action Plan to Conserve Coral Reefs, the National Oceanic and Atmospheric Administration (NOAA) has developed the Coral Reef Information System (CoRIS) which consolidates access to its coral reef data and information. CoRIS is a web-enabled, GIS-enhanced information system using a single web portal to gain access to NOAA’s coral reef data and information, activities, and library services. It provides users with search tools to help them discover data and information on coral reef ecosystems and adjacent habitats and communities.

The heart of CoRIS data discovery mechanisms is metadata. Coral data and products are maintained at distributed NOAA servers, where the data are managed. Metadata, however, are maintained on the central CoRIS server to support search capabilities. Over time, data and metadata will be stored in a central archive. Access to data is provided via links in metadata to host servers. Users have access to online data documentation (metadata) as well as to data, data products, preview images, and publications. An important feature of CoRIS is that each search returns a list of publications as well as data and data products that meet user needs. CoRIS users also have access to peer-reviewed scientific
articles, a coral glossary of over 700 terms, and summaries of listserv discussions about critical coral issues and topics.

The following types of data and information can be accessed at CoRIS:

- In situ measurements and observations from coral reef monitoring and research programs
- Photographs and digital video transects
- Benthic habitat aerial photo mosaics
- Data from long-term in situ coral reef monitoring stations
- Coastal aerial photographs
- Coral paleoclimatology
- Coral bleaching reports
- Bathymetric digital elevation models in coastal areas
- Nautical chart images
- Tidal data
- Advanced Very High Resolution Radiometer (AVHRR) Sea Surface Temperature (SST) satellite imagery data products related to coral bleaching
- Publications, bibliographies, underwater digital photographs, maps, web sites, virtual library searches and much more from the NOAA Library.


A variety of products prepared with the collaboration of international partners. These products reflect a broad scope of activity: (1) they present unique data sets that have been obtained under international projects, such as the Global Oceanographic Data Archaeology and Rescue (GODAR) and the World Ocean Database (WOD) projects; (2) they present empirical analyses of the data in select regions of the world; and (3) they provide information on historical marine investigations.


A collaborative effort with the Murmansk Marine Biological Institute. This product presents the physical and biological data for the region extending from the Barents Sea to the Kara Sea during 158 scientific cruises for the period 1913-1999. Changes in the plankton community structure between the 1930’s, 1950’s, and 1990’s are discussed.


A collaborative effort with the P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia. This product presents maps of the spatial distribution of temperature, salinity, oxygen, percent oxygen saturation, phosphate, nitrate, ammonium nitrogen, silicate, organic nitrogen and phosphorus for the Sea of Okhotsk, which were obtained using data from complex ecosystem studies by the Russian Federal Research Institute of Fisheries and Oceanography (VNIRO) and the Pacific Research Institute for Marine Fisheries and Oceanography (TINRO) from 1989-1997.


A collaborative effort with the P.P. Shirshov Institute of Oceanology. It consists of a printed document plus two CD-ROMs, one for seasonal and the other for annual frequency distributions. This product contains more than 80,000 plots of empirical distributions of temperature and salinity for 5-degree squares in the north Atlantic Ocean, for all standard levels, for each of the four seasons in the upper (0-400 m) ocean, and annual distributions for the deeper (500-5500 m) ocean.

**Volume 5: Russian Marine Expeditionary Investigations of the World Ocean - December 2002**

A collaborative effort with the All-Russian Research Institute for Hydrometeorological Information (RIHMI) - World Data Center for Oceanography, Obninsk, Russia. It is an endeavor to present the
most important results of sea voyages and ocean expeditions performed by Russian seamen from the late 17th century up to the present.

**Volume 6: Zooplankton of the Arctic Seas 2002 - March 2003**

A collaborative effort with the Zoological Institute, Russian Academy of Sciences, in Moscow, Russia. This Atlas consists of one CD-ROM containing physical and biological data for the Arctic and sub-Arctic regions extending from the Barents Sea to the northwest Pacific Ocean, which were obtained from 25 scientific cruises during the period 1903-1956.

**Volume 7: 36-Year Time Series (1963-1998) of Temperature, Salinity, and Zooplankton in the White Sea - March 2003**

A collaborative effort with the White Sea Biological Station, Zoological Institute, Russian Academy of Sciences, near Chupa (Karelia Region), Russia. This product presents data on temperature, salinity, and zooplankton, which were obtained once every ten days at a fixed point in the White Sea from 1963-1998. Time series of temperature and salinity are presented, and the impact of temperature and salinity variability on zooplankton development is described in quantitative terms.

**Global Argo Data Repository Development - February 2001**

In the year 2000, a global array of approximately 3,000 free-drifting profiling floats, known as Argo Ocean Profiling Network, was planned as a major component of the ocean observing system. All Argo data will be publicly available in near real-time via the GTS (Global Telecommunications System) and in scientifically quality-controlled form with a few months delay. Two Argo Global Data Assembly Centers (GDACs), the U.S. GODAE (Global Ocean Data Assimilation Experiment) Argo server and the French IFREMER (Institute for Research and Exploitation of the Sea) Argo server, are established to assemble the near real-time Argo data and provide them to the Argo users in a timely manner.

The U.S. NODC has established a unique center, known as the Global Argo Data Repository (GADR), that will perform as a long-term archive for Argo data. The objectives of the GADR are (1) to safeguard versions of the Argo data and information and (2) to provide high quality Argo data to a wide variety of users in a timely and user-friendly manner. NODC has developed a strategy for acquiring, processing, and distributing Argo daily data to the public. Argo daily data including real-time and delayed-mode profiles of ocean temperature and salinity (and conductivity, if any) measured by the Argo profiling floats are available at [http://www.nodc.noaa.gov/cgi-bin/dsdt/argo_latest_data.cgi](http://www.nodc.noaa.gov/cgi-bin/dsdt/argo_latest_data.cgi). This page provides access to these data processed by the NODC. They are available around 4am UTC every day for those arrived at the NODC on the previous day. This is only a part of Argo data, the rest will be available by September 2003.

**World Ocean Circulation Experiment (WOCE) DVDs - August 2002**

The U.S. NODC, in cooperation with the WOCE Data Products Committee (DPC), produced the final set, WOCE Global Data DVDs, Version 3.0, and distributed them to approximately 400 participants of the WOCE and Beyond Conference in San Antonio, Texas, November, 18 - 22, 2002. The WOCE Global Data DVD suite consists of two single-sided and double-layered DVDs. Each of which contain a series of directories (also known as folders). A Web browser is required for exploring and accessing to their contents. At the top level of both of the DVDs (the “root” directory) are identical copies of introductory files (web pages) prepared by DIU. Below this level are more directories containing the data files and documentation for each WOCE data type. The introductory pages provide tools and software, which are needed to search and locate data files or unzip files. They also include links to each data directory, where an index or welcome pages allows users to explore their contents. The contents of the WOCE Global Data DVD set is available on-line at [http://www.nodc.noaa.gov/woce_v3/](http://www.nodc.noaa.gov/woce_v3/). Following the production of the DVDs, Updates and Amendments to the contents are posted on-line at [http://www.nodc.noaa.gov/woce_v3/updates](http://www.nodc.noaa.gov/woce_v3/updates)

**Global Temperature-Salinity Profile Program (GTSSPP) - July 2001**
The NODC formed a team for migration of the Global Temperature-Salinity Profile (GTSSP) Database to Oracle and to enhance the integrity and fix the deficiencies of the database. The new GTSSP database is now running in Oracle with the Sybase version of the GTSSP database as a backup. As a result of the GTSSP enhancement project, the NODC prepared a complete data set containing profiles observed from 1990 to 2000 and contributed it as a part of the WOCE Upper Ocean Thermal (UOT) of the WOCE DVD collection. The WOCE-UOT DDVD can be found online at http://woce.nodc.noaa.gov/woce_v3/wocedata_1/woce-uot/welcome.htm

NODC Direct (http://www.nodc.noaa.gov/ - link to NODC Direct) - September 2002

NODC Direct is a web-based tool for accessing the oceanographic archive at the National Oceanographic Data Center. NODC Direct has migrated from a simple web-based selection page written in IDL and shell scripts to a sophisticated suite of Java servlets. This new technology allows faster, more advanced, more customizable queries against the archive at NODC. Users may form requests using date, ship, parameter, investigator, institution, or ocean area. NODC Direct delivers the request directly to the user’s desktop for immediate release.

NODC Direct has recently moved from a research and development mode into a production mode. In this new mode of operation, NODC Direct will be married with the recent updates to the NODC archive.

11. Comments:

NODC will work with regional, national and international partners to champion both an integrated environmental observation system of local to global scale and a supporting data management system that provides a comprehensive and scientifically validated monitoring capability in support of the National Oceanic and Atmospheric Administration’s mission goals. NODC is committed to working with IODE to meet its renewed mandate to serve the data and information needs of the IODE community.