1. **Name of Data Centre:** Hellenic National Oceanographic Data Centre - HNODC.

2. **National IODE Co-ordinator:**
   
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3. **Data Centre Address:** (As above)

4. **Data Centre URL:** [http://hnodc.ncmr.gr](http://hnodc.ncmr.gr)

5. **IODE Data Centre Designation Date:** 1986, NODC.

6. **Data Centre Description:**

The Hellenic National Oceanographic Data Centre (HNODC) operates within the framework of the National Centre for Marine Research (NCMR), in Athens. The latter is the leading marine research institute in Greece with a long experience in various fields of marine science and technology and important research activity. The NCMR along with the Institute of Marine Biology of Crete (IMBC) and various Hellenic university departments participate in several national development programmes, as well as, in international research projects. Within the framework of these activities systematic multidisciplinary surveys are carried out in coastal and open sea waters (mainly of the Eastern Mediterranean Sea) and a large amount of a wide range of data types is collected. However, data are valuable not only to the primary users, responsible for its original collection but also to a wide range of secondary users. In this context, the Hellenic National Oceanographic Data Centre has been recognized as a national facility to acquire, process, store and disseminate the oceanographic data pertaining to Mediterranean and Black Seas. Such a centralized management of oceanographic data not only improves the availability of data to end-users but also ensures that the data are preserved for long-term use, are of good quality and accurate and therefore suitable for the extraction of useful information.

The geographic area of the HNODC’s interest is the overall Mediterranean Sea, including the Black Sea. However, its main interest is concentrated in the Eastern Mediterranean Sea and the Black Sea. Major data holdings of the HNODC, for these particular regions consist of CTD data.
(over 13,000 stations), water bottle data (over 22,000 stations), moored current meter data (over 500 series, ranging from 10 days to 6 months each), plus chemical (over 9,000 stations) and geophysical data (over 30,000km of track). The data come from various data sources such as, different Hellenic research institutes which collect data (NCMR, IMBC, etc.), WDC-A, ICES, etc. The available data cover the entire 20th century of the majority of them being collected during the last twenty years. Most of the above-mentioned data have been collected in the Levantine Sea and are mainly water bottle data, while the majority of the CTD data have been obtained from the Aegean, Ionian and Adriatic Sea. Apart from the above-mentioned data, HNODC handles a great diversity of different other data types including biological data (chlorophyll, phytoplankton, zooplankton, benthos, etc.), sedimentological data, etc.

The technical environment of the HNODC consists of:

- Hewlett Packard Workstations
- PC Microcomputers
- Vector Plotters
- Colour and laser printers.

- ORACLE Relational DBMS
- PARADOX Relational DBMS
- GENASSYS Geographic Information Systems
- MATLAB, AVS Visual Data Analysis Software

- WINDOWS and X-WINDOWS Graphic Interfaces
- Graphics and Mathematics Libraries
- Client/Server Architecture
- ETHERNET and INTERNET Network
- C, C++, and FORTRAN 77 Compilers

HNODC’s data sets are kept in MEDATLAS Format and have been subjected to quality control (using the SCOOP software developed by IFREMER/SISMER) prior to their organization in a database, using the relational database management system (RDBMS) ORACLE.

7. Brief History:

The HNODC was established in 1986, in the frame of the cooperation of Greece with the Intergovernmental Oceanographic Commission (IOC) of UNESCO. The lack of suitable computer facilities, at the earlier stages of the HNODC establishment delayed its expansion capability considerably. However, a great progress was noticed during the last decade due to the technical support provided to the HNODC by the European Union (EU) and also to the participation of the HNODC in numerous marine data management projects, financially supported by the EU.

8. Roles and Responsibilities of the Data Centre:

The HNODC is a national agency, part of the international network of national oceanographic data centres operating within the framework of the IOC’s Committee on International Oceanographic Data and Information Exchange (IODE). As part of its contribution to the network, HNODC participates in different elements of the IODE system, including acquiring, formatting, quality controlling, cataloguing, archiving, disseminating and exchanging of marine data and information. In addition, HNODC provides active support to scientists processing their data and carries out work in developing techniques for the processing, display and dissemination of oceanographic data, using computer technology.
9. Data Centre Projects and Activities during the Intersessional Period:

During the intersessional period the HNODC was involved in several international projects and other activities related to ocean and marine data management issues. In particular:

- The HNODC along with IFREMER/SISMER (coordinator), the Spanish Data Centre and the Hydrographic Service of France implemented the EU/MAST Project MEDATLAS and compiled an up-dated climatological Atlas of the Mediterranean Sea. The contribution of the HNODC to the Project consisted of: (a) the development of a regional inventory and the assemblage of the vertical T/S profiles (XBT/MBT, Nansen casts and CTD) collected in the Eastern Mediterranean Sea (b) the implementation of quality checks on the T/S profiles over the Eastern Mediterranean Sea, and (c) the participation in the synthetic work, checking the computed climatology over the Eastern Mediterranean Sea.

- The HNODC was responsible for carrying out marine data management (formatting, quality control, archive and dissemination) within the framework of various EU/MAST research Projects, such as PELAGOS, CINCS, etc.

- The HNODC along with IFREMER/SISMER and OGS (Italy) participated in the data management component of the basin-scale EU/MAST-MTP research project MATER, within the framework of which around 150 different oceanographic parameters were measured, quality controlled and archived.

- The HNODC participates in the IOC/GODAR Project (Global Ocean Data Archaeology and Rescue) saving historical data sets for the Eastern Mediterranean Sea.

- The HNODC participates in the MEDAR/MEDATLAS-II Project, coordinated by IFREMER/SISMER and financially supported by the EU. In the project also participate data centres and specialized marine institutes from 20 countries and the international organizations EU, IOC/UNESCO and ICES. Main aims of the Project are: (a) to extend the positive experience gained by the MEDATLAS Project, to the entire Mediterranean and Black Sea communities (b) to enlarge the Mediterranean data base including bio-chemical parameters, and (c) to improve the spatial and temporal resolution of the statistics by adding other data not yet included in the past programmes. Additional, specific objectives of the Project are: (a) to complete the data-void areas in the eastern and southern parts of the Mediterranean Sea and Black Sea with new observed profiles and to improve the level of quality of the corresponding climatological statistical fields, through a wide co-operation of the Mediterranean and Black Sea countries (b) to make available comparable and compatible data sets of temperature, salinity and biochemical profiles by using a common protocol for formatting and quality checking (c) to prepare value added products including gridded statistics and maps that will be useful for the understanding and modeling of the Mediterranean and Black sea by using efficient and robust computation techniques (d) to facilitate the access to the archived data and enhance the data for various scientific, educational, industrial and environmental needs, through electronic publishing on widely disseminated media, and (e) to develop, implement and publish the existing quality control procedures for bio-chemical parameters, for meta-data, for climatologies and data products.

- Participates in the EU/MAST concerted action EURONODIM - Sea-Search (European Network for Oceanographic Data and Information Management) along with data centres from all the EU Member States. Main aim of the Project is to build upon previous achievements within EU/MAST Projects and to operate in a coherent and operational mode in order to strengthen the quality and service of ocean and marine data and information management in Europe. Additional, specific aims of the network are: (a) to develop, maintain and electronically publish, jointly, a number of meta-data products/directories, to keep track
of ocean and marine data and information and to improve the overall awareness, overview and access to ocean and marine data and information in Europe (b) to exchange experience and to cooperate in development, promotion and implementation of data and information management practices and methods, and (c) to develop and organize an overall capability for handling, processing, quality controlling and archiving of a large variety of oceanographic and marine data types, anticipating differences in capabilities of individual centres, and the evolution of new data types. Within the framework of the network an updating of the EDMED (European Directory of Marine Environmental Datasets) is currently taking place and a Directory of Cruise Summary Reports for the European countries is under development.

- Within the framework of the MEDAR/MEDATLAS-II Project, the HNODC organized a “Workshop – Training Course”, on “Data and meta-data quality control for the Black Sea and the Eastern Mediterranean Region”. This was held in Athens from 29 November to 10 December 1999 and was financially supported by IOC. In the “Workshop – Training Course” participated 30 scientists from 15 countries and representatives from the IOC/UNESCO and the EU.

- The HNODC organized an “Oceanographic Data and Information Management” Session within the framework of a major International Conference on “Oceanography of the Eastern Mediterranean and Black Sea”, held in Athens, during 23-26 February 1999. This Conference, which was co-sponsored and co-organized by the Institute of Oceanography of NCMR, the IOC/UNESCO and the EU was attended by more than 300 scientists and almost 100 papers were presented. A series of recommendations in regard to scientific issues, capacity building, data management and co-operation between the regions was adopted.

- The HNODC will provide, in autumn 2000, short term (two months) on-the-job training, on ocean data management issues, to a young scientist from Georgia, who will be financially supported by IOC/UNESCO.

10. Data Centre Products and Services Developed and/or Made Available during the Intersessional Period:

The HNODC contributed to the development of a major data product that is the MEDATLAS hydrological database and atlas. This represents the presently most comprehensive data set of historical temperature and salinity profiles collected since the beginning of the last century by many scientific laboratories and hydrographic services. It is available, by IFREMER/SISMER through a fully documented www catalogue and 3 CD-ROM with the analyzed statistical gridded data and maps of the digital atlas on 28 vertical levels. The gridded data give climatological references for following up the time variations in each basin. The user friendly design of the database intends to facilitate such studies not only for scientists, but also for students, engineers and environmental agencies.

The HNODC recently developed a multidisciplinary oceanographic data base for the Eastern Mediterranean Sea. The ORACLE RDBMS, related development tools (DEVELOPER-2000, pro-C, etc.) and third generation programming languages (C, FORTRAN) have been used for the data base development. The structures used for organizing the data in the database are project-cruise oriented, space-time oriented, originator oriented and subject oriented. The database supports querying with multiple searching selection criteria and in addition visualization and production of various data products. A programming interface, enabling access through www, which is now under development, will provide the scientific community with a fast, reliable and efficient way for accessing the database.

11. Comments:
A further expansion of the HNODC activities is planned for the coming years. This will include the management of fisheries and inland waters data. In addition, appropriate preparations are made in order to meet the data management needs for the forthcoming national operational oceanography programmes within GOOS and EUROGOOS. NCMR has already developed a data collection and management infrastructure and a network of multi-parameter measuring buoys will be deployed, in order to monitor the Aegean and Ionian Sea waters. The instruments provide a large amount of different types of real-time marine data and therefore for the appropriate handling of the data a suitable data management infrastructure is necessary.

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