INTERGOVERNMENTAL OCEANOGRAPHIC COMISSION
(of UNESCO)

Seventeenth Session of the IOC Committee on International Oceanographic Data and Information
Exchange (IODE-XVII)
Paris, France, 3-7 March 2003

IODE NATIONAL REPORT FOR INDIA
IODE NATIONAL REPORT FOR INDIA

Version: 26 February 2003

1. **Name of Data Centre:**
   Indian Oceanographic Data Centre (IODC)

2. **National IODE Coordinator:**
   Name: J.S. Sarupria
   Address: Head, Data & Information Division, National Institute of Oceanography, Dona Paula, Goa, Pin 403 004 INDIA.
   Tel: +91-832-2456700 (12lines) Ext. 4211
   Fax: +91-832-2456702 / 2456703
   E-mail: sarujs@csnio.ren.nic.in or sarujs@darya.nio.org

3. **Data Centre Address:**
   As above

4. **Data Centre URL:**
   http://www.indian-ocean.org/support/inodc/index.html

5. **IODE Data Centre Designation Date:**
   1964

6. **Brief History**
   The Indian Oceanographic Data Centre (IODC) was established in 1964 at the National Institute of Oceanography (NIO), Goa, India. NIO is a premier institute for oceanographic research and development. It has highly qualified staff of scientific (195 nos) and technical (235 nos.) NIO publishes on average more than 100 research papers, articles and technical reports in oceanography annually. IODC is having four scientific qualified staffs and four technical & supporting staffs. IODC is using PCS AVIION 3600 unix system with open ingress RDBMS. A new computer system DEC Alpha, True Unix system with oracle-9i procured and installation work is in progress. Windows PCs also used for oceanographic data/information management works.

7. **Roles and Responsibilities of the Data Centre:**
   The IODC assists national and international users in developing and enlarging their competence in the field of marine science. ODC plays a dual role, one by dissemination of data / information to the user communities and the other is to assist the data personnel in processing, validating, reformatting different types of data generated from the Indian Ocean region. The main responsibilities of IODC are:
   - To acquire oceanographic data and information for the Indian Ocean.
   - To reformat, and perform quality control checks on data.
   - To develop /update databases.
   - To develop value-added data / information products.
   - To disseminate data / information to users community.
   - To provide training in oceanographic data/ information management.

8. **Description of national data and information management coordination**
   Indian Oceanographic Data Centre (IODC) at National Institute of Oceanography (NIO) has been recognized as a national and international facility to acquire, process, store and disseminate the oceanographic data / information pertaining to the Arabian Sea, Bay of Bengal, Laccadive Sea, Andaman & Nicobar Sea and the Indian Ocean. The main objective of IODC is to manage entire spectrum of oceanographic data and thereby satisfy the need (as far as possible) of the user
communities. The centre ensures that the users would get good quality data which can generate useful information. The centre is managing the databases for temperature, salinity, dissolved oxygen, phosphate, nitrate, nitrite, silicate, carbon, phytoplankton, primary production, zooplankton, chlorophyll a in the water column of the Indian Ocean. IODC is also managing the databases for marine geophysical and geo-chemical parameters.

8.1 Ocean observations in Indian Ocean:
- 12 moored data buoys were deployed in the Indian seas in shallow and deep waters
- Argo floats deployed in the Northern Indian ocean under the national Argo program
- XBT observations were carried out in Bay of Bengal region, Western Indian ocean and Southern Indian ocean along shipping route under ship of opportunity program.
- 3 Current Meter Arrays deployed at the locations 93E, 83E and 76E longitudes along the equator in the Indian Ocean
- 7 drifting buoys were deployed in the Indian Seas
- 2 Sea truth campaigns for IRS-P4 sensors were carried out.

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

9.1 Data Centre projects:
The following projects on Data / Information Management were undertaken during the inter session period.
- National Ocean Information Services (NOIS) sponsored by Indian National Center for Ocean Information Services (INCOIS) of Department of Ocean Development, New Delhi (Govt. of India) (2000-cont.).

Under the project 14 National Marine Data Centres have been established at the expert institutions to handle the data on surface meteorology, marine geology, marine geophysics, marine algae, marine pollution, fisheries, tide, oceanography, remote sensing and bio-active substances in the seas around India.
- Develop GIS based coastal oceanographic databases and information system. Project funded by Dept. of Ocean Development (DOD), New Delhi (Govt. of India) (1999-2002)

The project started in July 1999. Under the project, Department of Ocean Development (DOD) has established nine data/samples collection centres along the Indian coasts. These centres are collecting oceanographic data and information on physical, chemical, pollution and biological parameters since 1990. IODC is developing databases for biogeochemical parameters for the estuaries and coastal region of India.
- Indian National Center for Ocean Information Services (INCOIS) an autonomous body under Dept. of Ocean Development (DOD) was established in February 1999 with a mandate to synthesizes, ocean observations, satellite oceanography, ocean information and advisory services. The centre is managing the following four project:
  - Indian ocean modeling and dynamics
  - Satellite coastal and ocean research
  - Argo floats to measure temperature and salinity of the upper indian ocean periodically
  - Other ocean observation systems.

9.2 Data Centre activities:
Processed information / data are utilized to satisfy the oceanographic users society as per their requirements. We have supplied oceanographic data and data products to more than 100 users during the inter session period. These agencies are working in the fields of research and development, educational, defense, industrial and data management sectors. During the inter session period, we have developed and updated thirteen databases on oceanographic parameters for the Arabian Sea, Bay of Bengal, Laccadive Sea, Andaman & Nicobar Seas and Indian Ocean region. We have exchanged the data / information under IODE network of NODCs, RNODCs and WDCs.
9.2.1 Data analysis:

- XBT data from Antarctic waters was processed to check the probes fall rate in the Antarctic water. The results show that probe’s fall rate is retarded due to the low temperature water in this region. Manuscript on the findings of this work is reported to the Journal of Atmospheric and Oceanic Technology.
- Digital Bathythermograph (DBT) data was processed to check the systematic bias in temperature and the result is reported to Journal of Oceanography.
- Data on primary productivity was processed within the EEZ of India and fishery potential was calculated and the result was reported in the workshop.
- Quality control system for biological oceanographic data in the Northern Indian Ocean was developed and the result was presented in the COD conference held in Brussels, Belgium, 25-27 Nov.2002.

9.2.2 International Workshops / Trainings/Meetings:

- Participated in two workshops, two training courses and two meetings on different topics related to marine sciences during the period. These are as follows:
  - Participated in the national workshop on Bay of Bengal Monsoon Experiment (BOBMEX) initial results held at NIO, Goa, 15-16 February 2001
  - Participated in international Conference on the Colour of Ocean Data at Flanders Marine Institute, Brussels held 25-27 November 2002.
  - Participated in IOC Mission to Sri Lanka, to assist NODC, Sri Lanka, Colombo, 4-10 November, 2001,
  - Individual training on oceanographic data/information management was arranged for NODC Sri Lanka at IODC/ NIO Goa during April-May, 2002.
  - Participated in the Indian Ocean Argo Implementation meeting held at Hyderabad, India 26-27 July 2001
  - Participated in Aquatic Science and Fisheries Abstracts (ASFA) Advisory Board Meeting held in France, 19-22 June 2001.
  - Participated in JGOFS (Joint Global Ocean Flux Study) Data Management Task Team Meeting held in USA 28-31 January 2002

9.3 Marine Information Management activities:

Marine information related activities at the National Information Centre for Marine Science (NICMAS) are as follows (since Dec.2000):

- Work done during IODE Intersession period in Marine Information Management (2001 –2003, January) by National Information Centre for Marine Sciences (NICMAS)
  - The centre continued to provide information required by the specialists within India and abroad. The centre produced a database of literature on Indian Ocean (Indian Ocean: A database of abstracts) and is available on CD for a membership.
  - The website on providing general information to the seekers on Indian Ocean (http://www.indian-ocean.org).
  - NICMAS continues to provide contributions to IOC’s MIM activities by extending expertise and voluntary inputs.

10. Data Centre Products and services developed and made available during the Intersession Period

The following oceanographic data/information products and software were developed by IODC.

10.1 NIO-BIO-CD:

A test version of NIO-BIO-CD was developed by IODC, contains 3956 historical biological profiles collected in 1951 to 1996 on primary productivity, chlorophyll-a, zooplankton biomass, zoo-benthos biomass & density and bacterial analysis in the Indian Ocean. A part of the data of 1194 profiles were collected by the Institute on board the research vessels INS Darshak, R.V. Gaveshani, and ORV Sagar
Kanya during 1974 to 1996 and 2762 profiles were taken from the IOC data report (Published in 1974) having the biological data sets collected by many countries in Indian Ocean since 1951.

10.2 Data Visualization S/W:
A window based system has been developed for the selection, retrieval and visualization of biological data archived in the Indian Oceanographic Data Centre (IODC) data bank. The system is developed in Visual Basic (VB) and it has three modules namely selection, visualization and retrieval of biological data sets. The first module for data selection operates on input information namely, (i) area (range of lat. and long. or clicking the four coordinates from the map), (ii) cruise / station references, (iii) period (year / months) selection. The selected data profiles can view by visualization module. The module also plot average profile of the variable considering all the stations of the cruise and overlay a profile of the station. Thus the module can check the variation in the station profile over the average cruise profile. The system has been developed, interfaced and tested with forty five years historical biological data sets.

10.3 Bio data quality control S/W:
A quality control system has been developed and performed the quality control (qc) checking on the primary production (pp) and chlorophyll-a (chla) profiles in the Northern Indian ocean collected from 1976 to 1997 by R.V.Gaveshani cruises(1976-94) and ORV Sagar Kanya cruises(1985-1997). These quality checks are based on the Meta data inventory, duplicate, range, maximum value of specific production, tail end increase and statistical. Preliminary quality check is performed by visual inspection of the vertical profiles of pp and chla along with temperature. Individual station profiles of the parameters were selected and plotted in the same plane so as to compare the nature of the profile easily. Other quality check on pp was done by computing the chla specific pp i.e. mgc(mg chla)-1d-1 and verify whether the ratio is question falls below or above the theoretical possible maximum value. This ratio will maximum at light saturation and known as specific production or Assimilation No.(AN) Here AN was fixed as 250 and we found that about 5% of the data are in question. Another qc was perform on pp called tail end increase. This test is based on the limit of the euphotic zone. It has been noticed that about 11% of pp values from 1% light depth is more than the value at the depth immediately above. Statistical check were carried out by grouped the data in 1°X1° or 2°X2° latitude-longitude square depending on the number of data sets available. Mean and standard deviation (SD) for the values from every depth were computed irrespective of the season. Maximum and minimum value of each depth were fixed as mean ±5SD when land area contained in the square. In other case area the maximum and minimum value were fixed as mean ±3SD. Below 50m depth the criteria set was that the values should be between mean ±3SD. All the values of pp and chla passed this test.

10.4 Data dissemination activities
- A total of 120 data requests were handled during the period and the requested data were disseminated to users on computer media (floppies / CDs, email).
- Progress reports on JGOFS (India) Oceanographic Data / Information Management, were presented in the JGOFS Data Management Task Team meeting held in US NODC Silver Spring USA 28-31 January, 2002.
- Oceanographic data for physical, chemical and biological parameters were processed in the Arabian Sea and the Bay of Bengal for the sponsored project.
- IOC mission was taken to Sri Lanka to assist the National Oceanographic Data Center of Sri Lanka (NODC-SL) and provided the training to a staff member of NODC-SL.
- Twenty NIO-HYDRO-CD were distributed on request to the users.
- Two Directory Interchange Formats (DIF) were written for CDs developed by IODC namely JGOFS (India)-CD and NIO-Hydro-CD. These DIFs were posted on NASA Web Site in Global Change Master Directory (GCMD) format for the user interaction and promotion.
- The data announcement (DA-17) for NIO-Hydro-CD was developed and distributed to the users under user’s interaction program.

11. List of activities that were undertaken during the inter-session period to promote IODE:
- continue to provide contributions to IOC MIM activities by extending expertise and voluntary inputs
• Input to JGOFS (Joint Global Ocean Flux Study) Data Management Task Team
• IOC Mission to assist NODC, Sri Lanka, Colombo.
• Training on oceanographic data/information management to the NODC Sri Lanka
• Input to the Global IOC Program for Argo floats in Indian Ocean
• Visit from MIRC Japan for collaboration works
• Visit from RHAMI-WDC-B Russia for collaboration works

12. Future plans:
• To develop WEB base data/information dissemination system
• To develop Coastal data/information management system
• To strengthen data/information monitoring system
• To develop value added information products for Indian Ocean.

13. Comments:
We suggest that IOC/IODE should provide substantial resources to take up a new project in the Indian Ocean region for enhancing the IODC/IODE activities by developing the IODE network in the region.