IODE Training Course in Ocean Data Management for the Caspian and Black Sea Regions

Organised in cooperation with:
Iranian National Center for Oceanography

Tehran, I.R. Iran
20-30 October, 2002
Abstract
The IODE Training Course in Ocean Data Management for the Caspian and Black Sea Regions was held in Tehran, I.R. Iran between 20 and 30 October 2002, hosted by the Iranian National Center for Oceanography (INCO). The workshop was attended by students from Azerbaijan, Georgia, Islamic Republic of Iran, Romania, Russia, Turkey and Ukraine. Lectures were provided by resource persons from the Islamic Republic of Iran and the IOC. The workshop programme was based on the IOC OceanTeacher capacity building tool - an extensive collation of documents on marine data, formats, software, program and data management procedures, manuals, protocols, and associated tutorials.
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1. **INTRODUCTION AND OBJECTIVES**

The IOC Committee on International Oceanographic Data and Information Exchange (IODE) at its Sixteenth Session (Lisbon, Portugal, 31 October-8 November 2000) adopted Recommendation IODE-XVI.11 by which, *inter alia*, it was recommended to organise a regional training course on data management for the Caspian and Black Sea regions.

In response to this decision the IODE Training Course in Ocean Data Management for the Caspian and Black Sea Regions was held in Tehran, I.R. Iran from 20-30 October 2002.

The Training Course was organised in cooperation with and kindly hosted by the Iranian National Center for Oceanography (INCO) and was attended by students from seven Caspian and Black Sea nations.

2. **PARTICIPANTS**

Participants attending the course were from Azerbaijan, Georgia, Islamic Republic of Iran, Romania, Russia, Turkey and Ukraine. Lectures were provided by resource persons from the Islamic Republic of Iran and the IOC. The list of participants and lecturers is provided as Annex II.

3. **COURSE PROGRAMME**

3.1 **OPENING**

The Training Course was officially opened on 20 October 2002 by Dr. Hadjizadeh Zaker, President of INCO. In his opening speech, Dr Hadjizadeh emphasised the importance of oceans in the development of countries and the considerable resources and facilities allocated to oceanographic research. He outlined the major developments in oceanographic sciences in Iran and stated that the aim of the Iranian National Center for Oceanography, as a research arm of the Ministry of Science, Research, and Technology, is to promote the science of oceanography, by various means, including the holding of training courses with participation of international experts and scientists. He summarised the training courses planned with the support of IOC and INCO. Finally, he wished all guests a happy and enjoyable stay in Iran and expressed a hope that all participants will benefit from the training course and contribute to the promotion of oceanographic knowledge in the Caspian and Black Sea regions. A copy of Dr Hadjizadeh’s speech is contained in Annex III.

Mr Greg Reed, IOC Secretariat, in his opening address thanked the Iranian National Center for Oceanography for organising and hosting the training course. He outlined the main objectives of the IODE programme and detailed the capacity building component of this programme. He pointed out that the IODE Ocean Teacher would form the basis of this training course in ocean data management. The objective of Ocean Teacher is to provide training tools that can be used in IODE training courses as well as for self-training and continuous professional development. In conclusion, he wished all participants a successful workshop.

Dr Alaeddin Malek, Data Centre Manager for INCO, in his address provided some background to the IODE programme and detailed the IODE data centre system of National Oceanographic Data Centres, Designated National Agencies, Responsible National Oceanographic Data Centres and World Data Centres for Oceanography. He mentioned that the IODE System is managed by the IOC Committee on IODE (one of the IOC Subsidiary Bodies), IODE Officers, IODE National Co-ordinators and the IOC Secretariat. He also detailed some of the IODE capacity building programmes including ODINAFRICA and ODINCARSA.

3.2 **COURSE INTRODUCTION**

Mr. Greg Reed from the IOC introduced the training course. The IODE Ocean Teacher capacity building tool would form the basis of the data management training curriculum. This product is based on an extensive collation of international public documents on marine data, formats, software, program and
data management procedures, manuals, protocols, and associated tutorials. It provides a broad spectrum of background information on global data and information archiving activities, specifications for data storage in standard formats, and the software tools to perform many quality-control, subsetting, and analysis procedures.

One of the components of Ocean Teacher is the Resource Kit Training Manual, a collection of outlines, notes, examples, and miscellaneous classwork documents. The aim has been to organise the original source documents and reference materials into the Kit itself, while saving the instructional materials that point to these documents for this Manual. The Manual and its integral course outline has been developed over a number of years and is used widely in all IODE capacity building programmes for ocean data and information management.

3.3 LECTURES AND PRACTICAL EXERCISES

3.3.1 Workshop Objectives

The curriculum for the IODE Training Course in Ocean Data Management for the Caspian and Black Sea Regions has been designed to provide participants with knowledge and skills in the following areas:

- The importance of marine data in general, and particularly within participants’ national and regional environments
- How to set up an oceanographic data centre within the IODE System
- How to manipulate and analyse the principal types and formats of marine data
- How to develop a National Hydrography Data Collection
- How to produce ocean data products and to disseminate these products

3.3.2 Workshop Abstract

The following topics were selected for coverage in this training course. They have been selected from the many topics included in the OceanTeacher Resource Kit and the curriculum developed for the Training Manual.

- The IOC/IODE System
  - Overview of international programs in marine data and information management
  - Introduction to the types of data they maintain
- Basic Data Concepts
  - What are the formats we use for marine data?
  - How do we construct data files?
  - What are the special "tricks" a marine data manager must know?
- Data, Metadata and Information
  - Where do we get data?
  - What are the major data types we must work with?
  - What is metadata, and how do we use it?
  - What is the "best" metadata system for marine data?
  - How is "information management" related to "data management?"
- Data Manipulation and Analysis
  - What are the software tools available for use with marine data?
  - What relationships exist between marine data formats and available software?

Classroom Exercises

- A sequence of exercises to construct a complete National Data Collection, using datasets from the World Ocean Database 2001, plus instructions on methods to create data products for synthesis in a GIS browser.

In addition, lectures on geospatial data infrastructure were provided by Dr Saadi Mesgari from the K.N. Toosi University of Technology, Tehran.

The final program and timetable for the workshop are presented in Annex I.
3.3.3 Workshop Technical Outline

The following is the outline of the OceanTeacher Training Manual prepared for this training course. All of the following topics were covered in lectures and practicals, using basic reference materials contained in the IODE Resource Kit (outlined in Annex V).

- The IOC-IODE System
  - Overview
    - NODCs - National Oceanographic Data Centers
    - DNAs – Designated National Agencies
    - RNODCs - Responsible National Oceanographic Data Centers
    - Intergovernmental Oceanographic Commission's (IOC) Committee on IODE
    - Role of an NODC
  - WDCs - World Data Centers
  - Marine Data
    - Introduction to Datasets
    - Oceanography Primer

- Data Concepts
  - Data Formats
  - Special Topics
    - Code Tables
    - Geographic Coordinates
    - Map Projections
    - Global Sectors

- Data, Metadata and Information
  - Global Sources of Data
    - Major Publishers
    - Major Publications
    - Major Formats
    - Data Media
  - Metadata
    - Overview and Importance
    - Cruise Summary Reports
    - Review of Standards and Systems
    - Marine Environmental Data Index (MEDI) – Introduction
    - MEDI Installation
    - MEDI data entry exercise
  - Marine Information Management
    - Introduction to MIM

- Data Analysis and Products
  - Software: Analysis Tools
    - Software Installation

- National Hydrographic Data Collection
  - Define Area of Interest (AOI)
    - Exercises to show some of the methods to examine relevant scientific and political concerns in making decisions about the AOI.
  - Create Data Collections
    - Exercises to teach how to create a national data collection using World Ocean Database 2001 and the Ocean Data View software.
  - Add Other Data
    - Exercises to add local datasets to the national collection using ODV-compatible spreadsheet.
  - Create a Regional Data Collection
    - Exercise to create a Regional Data Collection for the following Regions: Caspian Sea, Black Sea, Aegean Sea, Persian Gulf

- Analysis and Quality Control
• Exercises to introduce some of the common analysis products that can be made with Ocean Data View, and how they can be interpreted and used for quality control.
  • Exporting Products
    • Exercises to show how to use ODV as an engine for the generation of products.
  • Data Gridding and Contouring
    • A set of exercises to provide instruction on how to use SURFER for some common analysis techniques.
  • Managing Hierarchical Data Format (HDF) files
    • A set of exercises to show how to perform special data extraction and conversion procedures of HDF files
  • Managing Images
    • Exercises to obtain an image from an HDF file, manipulate it to a desirable size, and convert it to GeoTIF.
  • Geographic Information System Synthesis
    • Exercises to combine data products into a "project" in the program ArcExplorer, a GIS browser.

• Data Product
• Data Atlases
  • Review of Atlas Planning and Preparation

4. COURSE EVALUATION

At the conclusion of the course, an evaluation of the students’ opinions regarding course content and format was conducted. A copy of the Participant Assessment is listed in Annex IV. The results of this evaluation will be used to determine the course content for future follow-up training.

5. RECOMMENDATIONS

All participants agreed that follow-up to this course would be beneficial. This follow-up could take the form of on-line discussion between students and an additional course in data management. Subjects identified for a future course include data formats (including data exchange and data conversion), quality control (primarily for CTD data), data simulation, ODV analysis and use of satellite data (for example, sea surface height).

Students were reminded that the IODE Ocean Teacher was a dynamic product and the latest version should always be consulted at http://OceanTeacher.org.

It was recommended that the report on the IODE Training Course in Ocean Data Management for the Caspian and Black Sea Regions should be widely circulated within the IODE system.

6. CLOSURE

The Training Course was officially closed by Dr Hadjizadeh Zaker, President of INCO. He congratulated the participants on their successful completion of the Course and expressed his wish that the participants would utilize the knowledge and experience obtained through the Course.

On behalf of the IOC, Mr Reed, thanked the organizers of the Course for providing the excellent facilities. He pointed out that the objective of the OceanTeacher system is to provide training tools for Oceanographic Data Management during IODE Training Courses but these can also be used for self-training and continuous professional development. He encouraged the participants to make use of the material contained in OceanTeacher when they returned home.

Each participant was awarded a certificate indicating that they have taken part in the Course.
# ANNEX I

## COURSE PROGRAM AND TIMETABLE

<table>
<thead>
<tr>
<th>Day</th>
<th>Topic</th>
<th>Content</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sunday</strong> 20 October</td>
<td>Opening ceremony Preliminaries</td>
<td>Welcome addresses</td>
<td>IODE Resource Kit and Training Manual</td>
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<tr>
<td></td>
<td>Introduction</td>
<td>Overview and Objectives</td>
<td>Description of RNODCs</td>
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<td></td>
<td>The IOC / IODE System</td>
<td>Participant Introduction</td>
<td>Description of NODCs, DNAs</td>
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<td>Introduction to OceanTeacher</td>
<td>The IOC Committee on IODE</td>
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<td>Overview of IODE</td>
<td>The Role of an NODC</td>
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<td>World Data Centres</td>
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<td>Description of the World Data Centre System</td>
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<td>Marine Data</td>
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<td>Introduction to Datasets</td>
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<td>Oceanography Primer</td>
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<tr>
<td><strong>Monday</strong> 21 October</td>
<td>Data Concepts</td>
<td>Data Formats</td>
<td>Format Types, Format Catalogue</td>
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<td></td>
<td>Data, Metadata and Information</td>
<td>Global sources of data</td>
<td>Special Topics</td>
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<td>Overview of major publishers of data</td>
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<td>Media types for data distribution</td>
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<td>On-line data servers</td>
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<td>Major Formats</td>
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<td>Metadata</td>
<td>Overview and importance of metadata</td>
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<td></td>
<td>Review of metadata standards and systems</td>
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<tr>
<td><strong>Tuesday</strong> 22 October</td>
<td>Marine Information Management</td>
<td>MEDI – installation</td>
<td>MEDI – data entry exercise</td>
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<td></td>
<td>Data Analysis</td>
<td>MEDI – data entry exercise</td>
<td>Introduction to MIM</td>
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<td>National Hydrography Data Collection</td>
<td>Introduction to OceanExpert</td>
<td>Introduction to OceanExpert</td>
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<td>Software installation (including ODV)</td>
<td>OceanExpert entry exercise</td>
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<td>Preliminary</td>
<td>Create Depth Contours in DXF Format</td>
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<td>Download Political Boundaries in BLN Format</td>
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<tr>
<td><strong>Wednesday</strong> 23 October</td>
<td>Create National Collection with ODV</td>
<td>Download Shapefiles</td>
<td>Create Basemaps in SURFER</td>
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<td>Create Original Data Collection</td>
<td>Export DXF and SHP Files</td>
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<td>Export a National Data Collection</td>
<td>Create ArcExplorer Projects</td>
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<td>Create a National Spreadsheet Template</td>
<td>Create an Area of Interest Rectangle</td>
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<td>Manual Data Entry</td>
<td>Select World Meteorological Organization (WMO) Areas</td>
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<td><strong>Thursday</strong> 24 October</td>
<td>National Hydrography Data Collection</td>
<td>Downloading WOD01 Data</td>
<td>Create a Project Spreadsheet Template</td>
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<td>Create Original Data Collection</td>
<td>Manual Data Entry</td>
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<td>Add Other Data</td>
<td>Export a National Data Collection</td>
<td>Import the Project Spreadsheet Template into ODV</td>
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<tr>
<td>Day</td>
<td>Activity</td>
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<tr>
<td>Saturday 26 Oct</td>
<td>Class Exercise: Create a Regional Data Collection for the following Regions: Caspian Sea, Black Sea, Aegean Sea, Persian Gulf</td>
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<td>Sunday 27 Oct</td>
<td>National Hydrography Data Collection</td>
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<td>Analysis and Quality Control using ODV</td>
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<td>Export Products in ODV</td>
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<tr>
<td>Monday 28 Oct</td>
<td>Gridding and contouring with Surfer</td>
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<td>Managing HDF files</td>
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<td>Tuesday 29 Oct</td>
<td>Guest Lecture: Geospatial data infrastructure</td>
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<td>Concepts and components</td>
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<td>Problems of data sharing</td>
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<td>Standardization and heterogeneity levels of data</td>
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<td>Clearinghouses and data catalogues</td>
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<td>Open GIS and agent-based GIS</td>
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<tr>
<td>Wednesday 30 Oct</td>
<td>National Hydrography Data Collection</td>
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<td>Managing Images</td>
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<td>GIS Synthesis</td>
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<td>Data Atlases</td>
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<td>Image Manipulation</td>
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<td>Convert to GeoTIFF</td>
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<td>Create an Arc Explorer Project</td>
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<td>Adding Data Layers</td>
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<td>Review of Atlas Planning and Preparation</td>
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</table>

Annex I
ANNEX II

LIST OF PARTICIPANTS

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ANNEX III

OPENING SPEECH

Dr N. Hadjizadeh Zaker, President, Iranian National Center for Oceanography

In the Name of God

I welcome you to the opening ceremonies of the IODE Training Course in Ocean Data Management for the Caspian and Black Sea Regions. This course is being held in collaboration with IOC/UNESCO and the Iranian National Center for Oceanography (INCO). The objective of this 10-day course is to improve the capabilities of these regions as regards ocean data management.

As you know, the oceans and their seas cover some 70 percent of the earth’s surface and their living and non-living resources play a crucial role in the process of life on the planet, so that without the oceans life, on earth, as we know it, would have been impossible. The air we breathe, the water we drink, the food we eat, and the climate in which we live, are all dependent on the oceans.

The use of the oceans and seas, as regard transportation, trade, food and mineral resources, and national security, occupies an increasingly significant position in today’s world.

The importance of oceans in the development of countries became an impetus for their better understanding. Oceanographic research has become a major scientific pursuit in the past two centuries and research in such areas as physics, chemistry, geology, and biology continue to gather pace. Today, both the developed and developing countries are allocating considerable resources and facilities to oceanographic research.

The ubiquitous nature of seas and oceans and the need for collaboration and coordination among various countries with regard to oceanographic research, provision of services, exchange of information, and capacity building in the area of technical oceanographic know-how, led to the establishment of the Intergovernmental Oceanographic Commission (IOC). The IOC was founded under the auspices of UNESCO in 1960 as an effective framework for international cooperation in oceanographic research between the UN Member States, as well as coordination among various UN agencies. The IOC provides assistance to its member states with regard to national and regional problems, through exchange of knowledge, information, and technology; and coordination of national programmes. A major part of IOC activities relates to supporting the effective participation of developing countries in oceanographic activities. In brief, the IOC objective is to boost the level of international cooperation and coordination, among member states, in the area of oceanographic activities relating to research, provision of services, and capacity building, with a view to a better understanding of the nature and resources of the ocean and coastal areas, and the utilization of this knowledge to improve management, sustainable development, protection of ocean environments, and decision-making in ocean related issues.

To realize these objectives, the IOC focuses on the following areas:

- Development and facilitation of international oceanographic programmes to improve human knowledge of critical oceanographic processes and their link to the management and sustainable development of ocean resources
- Effective design and development of a Global Oceanic Observation System (GOOS) to gather information needed for oceanographic and meteorological predictions
- Provision of a global leadership in the conducting of training programmes and technical cooperation in systematic observation of world oceans, coastal areas, and related research
- Assistance in the effective management of data and information resulting from various research projects, and oceanographic monitoring, as well as provision of easy access to such data.

The IOC consists of Ocean Science, Operational Observing Systems, and Ocean Services Scientific/technical subdivisions. The most important IOC programme in the latter area is the International Oceanographic Data Exchange (IODE). The IODE is a global network including of 60 National Oceanic Data Centers, in 60 countries. Among the major objectives of the IODE is to provide assistance to member states in order to acquire the necessary technical competence in the management of
oceanographic data. In line with this objective, the IODE conducts various training courses, including the present one.

Iran, located along three major bodies of water, i.e., the Caspian Sea, Persian Gulf, and Sea of Oman, and with some 3,000 kilometers of coastal borders is in a unique position. The sustainable development of these seas can play a crucial role in the economic development of the country, as well as the promotion of its national security. It is clear that such an objective calls for the promotion of oceanographic sciences in the country, as a foundation for maritime activities.

Fortunately, in the past two decades, oceanographic sciences, in spite of their nascent state in Iran, have undergone major development, and the ministries of Science, Research, and Technology, Agricultural Jihad, Road and Transportation, and Energy have paid special attention to this area of science. Various oceanographic related departments have also been created in institutions of higher education. There also is an increase in the volume of country’s oceanographic research projects. In spite of this, there still is need for major improvement in the country’s oceanographic capabilities, both in the area of skilled manpower, which is the foundation of any development, and equipment. The Iranian National Center for Oceanography as a research arm of the Ministry of Science, Research, and Technology, considers it its duty to endeavor to promote the science of oceanography in the country, by various means, including the holding of training courses with participation of international experts and scientists. At present, there are three training courses planned by the support of IOC and INCO, the first of which is the present one. A training course on Coral Reef is to be held in Kish Island in January 2003, and a training course in the field coastal studies will be held in Tehran in April 2003. Additional courses are also on the center’s agenda. The INCO is also engaged in upgrading its laboratory and field instruments, as well as developing research stations and acquiring a research vessel.

I wish a very happy and enjoyable stay in Iran for our guests from foreign countries. It is my hope that, you will be able to benefit from the current training course, and contribute to the promotion of oceanographic knowledge in the Caspian, and Black Sea regions.
ANNEX IV

IODE Training Course in Ocean Data Management for the Caspian and Black Seas

Tehran, I.R. Iran, 20-30 October 2002

Participant Assessment

The purpose of this questionnaire is to collect information for overall assessment of the Training Course and to improve future training and related activities. Please check as appropriate and write your comments and suggestions.

1. Do you think the Course programme was:
   Too advanced □ Informative □ To expectation □ Too basic □

2. Was the Course useful to your work? Did you learn anything that is new and useful for you?
   No use □ 2 3 4 5 Very useful
   Comments :
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________

3. Was the duration of the Course adequate?
   Too long □ Adequate □ Too short □
   Comments :
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________

4. In what way do you plan to apply the knowledge and experience gained during the Training Course when you go back home?
   Comments :
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________

5. Were your computer skills adequate to complete the class exercises
   Yes □ No □
6. If NO, in what way do you require additional training?
   Comments:
   
   

7. How were the local arrangements, like accommodation, transport, other facilities, etc?
   Poor          Excellent
   1 2 3 4 5
   Comments:
   
   

8. Any other comments and suggestions regarding the Course?
   Comments:
   
   

For example:
(i) Were all the subjects of specific interest to you covered?
(ii) What do you think IOC/UNESCO should do as a follow-up in this region?

9. How do you rate this Course?
   Unacceptable □  Poor □  Adequate □  Good □  Outstanding □
   Name (optional):
   
   Organisation:
   
   

# IODE Resource Kit

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- Objectives of quality control
- Quality control procedures

Quality Control of Data from Global Programs
- MEDS Quality Control Procedures
- TOGA/COARE Quality Control Procedures for Surface Meteorology Data
- BODC-WOCE Sea Level Data
- Assembly Centre Quality Assessment
- TOGA Sea Level Centre Quality Assessment Policy
- Quality Control of data received by Ocean Climate Laboratory

Quality Control References
- GTSPP Real-time Quality Control Manual (Manuals & Guides 22)
- Manual of Quality Control Procedures for Validation of Oceanographic Data (Manuals & Guides 26)
- Quality Control Cookbook for XBT Data

The Internet

Introduction to the Internet
- History of the Internet
- Electronic Mail (email)
- File Transfer Protocol (FTP)
- Telnet
- Discussion Groups
- Mailing Lists
- World Wide Web (WWW)
  - Web Browsers
  - Netscape Interface
  - Internet Explorer Interface
  - Browser Errors

The URL
- Search Engines
  - Search Syntax
- Netiquette
- Glossary of Internet Terms
- Beginners Guide to HTML (from NCSA)
  - HTML Tags - Quick Reference
- eXtensible Markup Language (XML)

GIS

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- Benefits of a Marine GIS
- GIS Glossary
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Data Analysis & Products

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ANNEX VI

GROUP PHOTOGRAPH