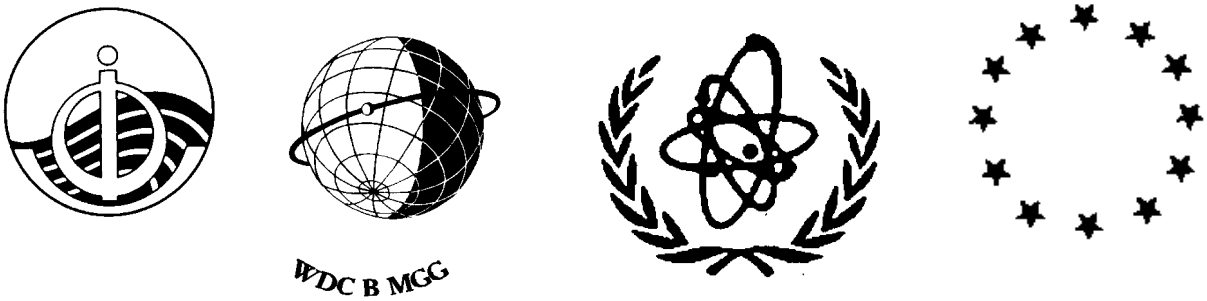
**Intergovernmental Oceanographic Commission**
*Training Course Reports* **45**




# IOC-ICSU-IAEA-EU Training Course on Marine Geological and Geophysical Data Management for the Countries of the Black and Caspian Seas Regions

World Data Centre B,
Marine Geology and Geophysics

Gelendzhik, Russian Federation,
8-19 September 1997

**UNESCO**

**Intergovernmental Oceanographic Commission**
*Training Course Reports* **45**

# IOC-ICSU-IAEA-EU Training Course on Marine Geological and Geophysical Data Management for the Countries of the Black and Caspian Seas Regions

World Data Centre B,
Marine Geology and Geophysics

Gelendzhik, Russian Federation,
8-19 September 1997

**UNESCO**
IOC Training Course Report No. 45

# TABLE OF CONTENTS

## 1. INTRODUCTION

The IOC Committee on International Oceanographic Data and Information Exchange (IODE) at its Fifteenth Session (Athens, Greece, 23-31 January 1996) adopted Recommendation IODE-XV.11 by which it was recommended to have a Training Course on Marine Geological and Geophysical Data Management during the intersessional period 1996-1999. Recommendation IODE-XV.11 was approved by the IOC Assembly at its Nineteenth Session in Paris, 2-18 July 1997. The Delegation of the Russian Federation made an offer to host the Training Course and provide facilities at WDC-B for Marine Geology and Geophysics located in Gelendzhik.

In response to this kind offer, the IOC-ICSU-IAEA-EU Training Course on Marine Geological and Geophysical Data Collection, Processing and Management for the countries bordering the Black and Caspian Seas was held in Gelendzhik, Krasnodar Region, Russian Federation, 8-19 September 1997. The Training Course was organized under the auspices of the World Data Centre B for Marine Geology and Geophysics (WDC-B, MGG) and was co-sponsored by the Ministry of Natural Resources of the Russian Federation, the Intergovernmental Oceanographic Commission (IOC), the MAST Programme of the European Union, the International Atomic Energy Agency (IAEA) and the Office of the Black Sea Environmental Programme (BSEP) of the UN Global Environment Facility (GEF).

The International Marine Geological and Geophysical (MGG) data exchange is supported by the IODE/IOC and WDC/ICSU systems. MGG data and information are very important for climate studies and the prospecting of oil, gas and mineral resources in the World Ocean and the Black and Caspian Seas region, in particular.

The purpose of the Training Course was to train participants in modern methods and technologies of marine geological and geophysical data collection, processing and usage, to make them acquainted with the main principles of international exchange of data and information and show them the creation of ocean databases.

The Training Course was directed by Dr. V. Shcherbakov, Director of the World Data Centre B, MGG. The staff of the National Marine Geological Data Centre assisted him in giving lectures, arranging practical work sessions and on-board training, as well as with all types of routine arrangements for the smooth running of the Course.

Dr. I. Oliounine, the Representative of IOC/UNESCO, delivered lectures and contributed to the formulation of the Course programme and its successful implementation.

## 2. PARTICIPANTS

Fifteen participants were selected from 10 IOC Member States of Europe and Asia, from the Black and the Caspian Seas region, namely Bulgaria, Georgia, Greece, Islamic Republic of Iran, Romania, Russia, Turkey, Turkmenistan, Ukraine. Two participants were invited from India (from the National Institute of Oceanography, Goa). All participants were well qualified and were involved in various fields of marine geological and geophysical data collection and management. Unfortunately, experts from Azerbaijan and Kazakhstan were not able to come to Gelendzhik due to different reasons.

Seventeen lecturers from the Russian Federation, France, USA, Turkey and the Ukraine were involved in the Training Course. The Trainee from India, Dr. G. Rao, gave a talk on the geological structure and geophysical fields of the Trans Indo-Ocean Geotravers (from Madagascar to Australia) and trainees from

Russia, Mr. V. Nedelsky and Mr. V. Sekachev shared their experience with the participants in the usage of the Internet system and bathymetry data processing and bathymetry maps preparation correspondingly. Special thanks are due to Dr. D. Divins, Dr. I. Oliounine, Dr. A. Mourakhine, Dr. V. Mamaev, Dr. V. Kurennoy, Dr. V. Lobanov, Mrs. A. Shcherbakova, Dr. O. Voitsechovich, Dr. V. Belokopytov, Ms. E. Svirilina and Mr. Y. Serikov, whose efforts in arranging the Course and making local arrangements convenient for the participants contributed very much to the success of the Course.

The List of Participants is given in Annex II.

## 3. COURSE PROGRAMME

The Training Course on Marine Geological and Geophysical Data Management was opened at the World Data Centre "B" for Marine Geology and Geophysics (WDC-B, MGG) on 8 September 1997 by the Director of the WDC-B MGG, Dr. V. Shcherbakov. In his opening address, he welcomed the participants, emphasized the importance of the Course for scientific and practical purposes and for establishing working contacts between marine geologists from different countries. He expressed strong hope that the Training Course would help participants to increase their input to the MGG data collection and exchange in the Black and Caspian Sea regions. He expressed belief that the training of specialists from neighbouring countries would permit to establish direct contacts between institutions and people and to find answers to different Black and Caspian Seas environmental problems.

Speaking on behalf of the IOC Executive Secretary, Dr. G. Kullenberg, Dr. I. Oliounine, Deputy Executive Secretary IOC, emphasized the importance of the Course for regional scientific research and co-operation. It was the second Training Course arranged by the IOC/IODE Committee on a special type of data - marine geological and geophysical. Many physical processes in the Black and Caspian Sea regions cannot be explained without understanding geological and geophysical processes. The Training Course was an attempt to get data managers in the region to become aware of modern technologies for data collection and handling. It comprised an important contribution to the mechanisms established within IOC and other international bodies for meeting objectives of such regional programmes as ComsBlack, Investigation of the Caspian Sea, Floating University and Marine Environmental Assessment in the Black Sea Region. Dr. Oliounine stressed that it was not by chance that the Training Course was arranged in Gelendzhik. It is the place where WDC-B for Marine Geology and Geophysics is located and which is world-known for its successes in marine geological and geophysical activities. Finally, he praised the local organizers for the facilities provided and commended the Russian organizations, the EU/MAST Programme and the International Atomic Energy Agency for their support, which made the course possible. Dr. Oliounine wished all participants every success and a nice stay in Gelendzhik.

The Programme of the Course was developed jointly by experts from WDC-B, MGG, IAEA and the IOC. The participants had the opportunity to get acquainted with the Course programme well in advance. The local organizers prepared a special brochure which included the time-schedule, programme and information on local arrangements. The programme was designed to cover 12 working days. It started at 10:00 on 8 September and finished at 17:00 on 19 September 1997. The final timetable and programme of the Course are presented in Annex I.

The following topics were discussed during the Training Course:

(i) The IOC/IODE and WDC systems; the Black and Caspian Seas countries scientific collaboration and place of the Russian Federation in regional co-operation and marine data management systems;

(ii) Formats for on-board digital data and information recording;

(iii) Collection of geological samples and non-digital data;
(iv) Quality control of data, information and documentation on samples, TV and photo collections;
(v) Methods for application of radio-tracer techniques to geophysical and sedimentological studies;
(vi) Development and management of databases and digital maps;
(vii) Digital remote-sensing data for coastal zone geology; GIS technologies and products;
(viii) MGG data and information holdings; data processing and dissemination metadata;
(ix) Data and information products; integration of databases; ORACLE objective databases.
(x) Internet system: WWW, Homepages, browsers, global networks.

During the Course, participants acquired knowledge about different MGG data collecting and processing methods and the usage of data on the basis of the experience of the two World Data Centres 'A' and 'B' for Marine Geology and Geophysics and of the recommendations given by leading experts of the Russian geological information survey.

The lecturers from WDC-B, MGG, Dr. V. Shcherbakov, Mrs. L. Shcherbakova, Ms. E. Svirilina, Mr. Y. Serikov, Mr. V. Nedelsky, presented the results of data collection and gave talks on designing, development and practical application of the up-to-date informational systems for geology and mineral resources of seas and oceans. Special attention was paid to techniques and formats for data acquisition, data processing and control, databases creation and data accumulation. Methods and structures of basic Data Base Management Systems and GIS technologies were described in great detail. Different marine geological and geophysical databases were discussed and demonstrated at practical working sessions. The participants had an opportunity to apply MGG data management procedures during working sessions and on-board training.

Special booklets have been developed by local organizers which contained texts of lectures and practical advice for application of the theoretical materials for individual projects development.

Dr. D. Divins, the Representative of WDC-A, MGG, gave a series of lectures on the following topics:

**MGG Data Standards and International Information Fund**

In order to assure the quality of marine geology and geophysical (MGG) data, it is necessary to promote, provide and maintain standards for these data.

It is necessary to design and populate a database. A database has a certain structure and the data in that database also has to have a structure to manage data effectively. Four key concepts of the data structure are metadata, self-documentation, accuracy and precision, and character and binary data representation. It is very important for a dataset to be self-documenting. A database should also maintain the original accuracy and precision of the primary data.

Metadata, or data about the data, is extremely valuable information. Metadata should be abundant, extensive, contain keywords, be intimately tied to the data, and be either free-form text descriptions or be contained in a structured format.

Data should be structured or formatted according to their usage. A collection may include both digital and analogue data. Data for exchange purposes should be in a very simple format so everyone will be able to read and use the data. Storage and archiving formats should be efficient, however, it is extremely important that data or information should not be lost when retrieving archived data. An appropriate compression scheme should be used if compression is required. Finally, there should be a processing format that allows the user to access the information quickly.

**Registration, Storage and Usage of Multibeam Echo Sounding Data**

Multibeam bathymetry is the fastest growing database at NGDC of USA. Huge volumes of multibeam data create quite a special problem of storage and archiving. It is very important to understand the collection technology so as not to oversample an area and overflood the archiving system with redundant data. There is a good example of multibeam data on the Internet. The RIDGE project has a web site where the user can create custom images for downloading. There is another problem: presently there is no standard exchange format for multibeam data. The data are available in so many formats as there are collection systems. Multibeam data come in a variety of forms, so metadata known for a multibeam file should always accompany the data; without this information the usefulness of the data are greatly reduced.

**Bathymetry Databases of the World Ocean - GEBCO-97**

Global Bathymetric Data - GEBCO-97 - is the second release of the GEBCO Digital Atlas (GDA). This is a co-operative effort between the International Hydrographic Organization (IHO) and the IOC. It includes the digitized bathymetric contours, coastlines, and trackline control; a digitized version of the International Bathymetric Chart of the Mediterranean (IBCM); a high-resolution, digital, global coastline; a digital gazetteer of undersea feature names; and a trackline inventory of the digital bathymetry held at the IHO Centre for Digital Bathymetry. It is accompanied by the GDA software interface.

A second global bathymetric database is the Measured and Estimated Seafloor Topography dataset produced by Walter Smith and David Sandwell. The dataset consists of bathymetric data for the oceans at a 3-10km resolution and was compiled by combining all available depth soundings collected over the last 30 years together with high resolution marine gravity information provided by the Geosat, ERS 1/2, and Topex/Poseidon altimeters.

**Collection and Recording Marine Geophysical (Bathymetry, Magnetic and Gravity) Data**

The "MGD77" format has experienced much success over the last 20 years. It has been sanctioned by the Intergovernmental Oceanographic Commission (IOC) as an accepted standard for international data exchange, and it has been translated by IOC into French, Japanese and Russian. Most contributors of data to NGDC now send their data in the "MGD77" format.

One of the most insightful aspects of the "MGD77" format is its inclusion of Metadata. Metadata enhances and extends the usefulness of the primary data, both in applications and in time. Geophysical data (bathymetry, magnetic and gravity) and seismic information (shot-point identification) are presented.

A summary and explanation of all the fields in both the header record and data record, as well as their formats is available on the Internet.

**GEODAS System of Storage and Retrieval of Bathymetry, Magnetic, Gravity and Navigation Data**

The trackline geophysical data management system is called GEODAS (GEOphysical DAta System). GEODAS contains about 5 Gigabytes of marine geophysical data in the "MGD77" format. The data are currently available on 3 CD-ROMs. GEODAS runs on DOS, Windows, Windows95 and 97 platforms and also on UNIX computers using Xwindows.

There are 3 components to the GEODAS system. The first component is management. The second component of GEODAS is data access and delivery. GEODAS has a well-developed infrastructure which supports the first two components of the system. This third component, or the infrastructure, includes software and metadata (the "MGD77" Header Record).

Within GEODAS there are inventory information and functions. A new feature available with Version 3.3, is the ability to plot data in colour, based on the values of a particular data type.

The GEODAS system is available for searching on the Internet. However, the only data that are available for downloading are those assimilated since the last release of the CD-ROMs.

There are "industry" standards, "standard practice" and "standard formats" of Data Base Management Systems.

Dr. O. Voitsekhovitch, an expert provided by the IAEA, delivered lectures on subjects related to the Agency's Technical Co-operation Project on "Marine Environmental Assessment in the Black Sea Region" and acquainted participants with methods used for Black Sea radioactivity data collection and radiotracer applications in geophysics and sedimentology. The main topics of his lectures were:

- **Marine radioactivity monitoring and data collection:** description of the Black Sea monitoring programme, methods and equipment; types of samplers for water, bottom and suspended sediment; practical applications; analytical quality control, intercalibrations; IAEA's 1998 Black Sea cruise;

- **Behaviour of radionuclides in the Black Sea environment:** physico-chemical properties of radionuclides of interest in the Black Sea; solid-liquid interactions; impact of Chernobyl radionuclides on the marine environment; time-series of Cs-137 and Sr-90, vertical profiles and mixing; cycling of redox-sensitive radionuclides; balance of radionuclides in the Black Sea;

- **Applications of radiotracer techniques to geophysical and sedimentological studies in the Black Sea:** activities within IAEA's 1993-1995 CRP on "Application of Tracer Techniques to the Study of Processes and Pollution in the Black Sea"; water mass tracers; application of sedimentation traps data; various approaches to sediment dating; Cs-137 profiles in sediment; Pb-210 dating, measurements and models; case studies in shelf and deep basin areas.

During the lectures a comprehensive analysis was presented of the state of the art equipment and methodologies used for studies of water mixing and circulation, sedimentation and sediment transport by means of natural and anthropogenic radiotracers. An introduction to computerized databases for marine radioactivity and to computer modeling related to radiotracer applications was given during a practical session.

In addition to the lectures, 17 practical training sessions were arranged. These sessions included recording of different types of cruise data into special formats, preparing documentation for samples collections, applying various data and information control procedures manually and with the usage of computer facilities. Practical sessions were arranged on the development of databases with the help of PCs and SUN SPARC workstations.

The following software packages for managing marine geological, geophysical and geochemical databases were presented: GEOLOGY (National RF database), GEODAS, DSDP, ODP (developed by NGDC, NOAA, USA), Geological stations (prepared by WDC-B, MGG), GEBCO (developed by IOC, BODC), Geological Map and Mineral Resources of the Russian Federation (scale 1:2 500 000, produced by GlavNIVC, Ministry of the Natural Resources of the Russian Federation), GIS general digital maps and separate layers.

Oceanographical, geological, geophysical, geochemical, hydro-geological and geo-ecological maps of the Black Sea and shelf regions of the Russian Federation were presented as GIS computer products and databases.

Methods for data searching and extracting from different databases, for file development, for data visualisation and processing and for drawing final geological survey documents, were demonstrated .

Visit to the Geophysical Computer Centre (Gelendzhik) was organized which was useful for understanding seismic data processing and technology of seismic and seismo-acoustic data recording on magnetic tapes and archiving on Exabyte media.

Participants of the Training Course received packages containing training materials which included forms and formats, technological schemes and documents, diskettes of data and software.

Each trainee had an opportunity to get acquainted and receive data from WDC-B, MGG databases.

All lectures, practical sessions, and documents were available for the participants in English and Russian.

## 4. ON-BOARD TRAINING

According to the Training Course programme, on-board training was organized during two working days (16-17 September 1997) on board the Research Vessel *Yantar* (shipowner: state enterprise, "Central Geological and Geophysical Expedition"; port of registry: Novorossiysk).

The main parameters and dimensions of the R.V. *Yantar* are given below:

| | |
|---|---|
| Year, country of build | 1975, USSR |
| Gross tonnage, t | 266 |
| Overall length, m | 33.9 |
| Extreme breadth, m | 7.0 |
| Summer draught, m | 2.6 |
| Autonomy, days | 7 |
| Crew and scientific staff, persons | 15 |

Scientific equipment/laboratory:

| | |
|---|---|
| Seismo-acoustic system (24 channels) | 1 |
| Side scan sonar system ("Katran") | 1 |
| Geochemistry and ecology laboratory | 1 |
| Sampling device (grab, photo), multi-corer, KADR corer, STD system) | 5 |
| Echo sounders (shallow/deep water) | 2 |
| Geological laboratory | 1 |
| Geophysical laboratory | 1 |
| Navigation systems (including GPS) | 3 |

The equipment for special IAEA training was provided by the Ukrainian Hydrometeorological Institute (Kiev, Ukraine) and by the Southern Branch of the Institute of Oceanology of the Russian Academy of Science (SBOI, RAS, Gelendzhik, Russia). This equipment included: two samplers for collection of shelf bottom sediments from water depths below 100 m, large box corer (provided by the IAEA), gravity corer, water sampling system including filtration unit for suspended matter and extraction unit for radionuclides in solution.

Before on-board training there was a review lecture about the research vessel *Yantar* and its equipment, laboratories and facilities. Training included demonstration and practical work with the 3 types of bottom sediment corers working at 10m depth in Gelendzhik Bay and at 50m depth in the open sea. All aspects of the preparation of samples preceding analytical work were presented.

A method of water sampling was demonstrated with the help of the "MIDIA" filtration system. At each station 500 litres of surface water were sampled, during 1.5 hours. Filtration and *in situ* extraction were performed and processed.

The participants thus had the opportunity to exercise the sequence of ship-board operations associated with marine radioactivity surveys and with radiotracer studies of interest in marine geology and geophysics: sampling, sample preparation, storage, documentation, recording of information on sample and ancillary data, quality control/quality assurance.

## 5. COURSE EVALUATION

The Training Course evaluation was arranged in the form of a "round-table" discussion. Results of these discussions and different opinions and recommendations are presented below.

The participants considered the programme of the Training Course as very well prepared. The programme was fully and successfully implemented. The Course was carried out in business-like and friendly atmosphere.

The theoretical part of the Course was very highly estimated and was recommended for a special publication in Russian and in English. It was agreed that the WDC-B, MGG jointly with WDC-A, MGG prepare a volume of the texts of the lectures and consider the ways for its publication. IOC and IAEA were invited to contribute to the implementation of this proposal. In future, it will be used as an important basic tool for the training courses of the same nature and will be widely distributed to Member States and data centres.

The training part of the Course was adequate to the quality of lectures and sufficient. The trainees expressed desire to have more sessions, especially more training on SUN SPARC stations, managing databases and on the Internet. They agreed that the new GIS technology and introduction to the ORACLE database managing system has to be included in more detail in future courses.

The participants considered the on-board training as very successful. They wished to have more on-board training days to become better acquainted with data collection methods and technology.

It was proposed to develop and disseminate among all participants a special software package, which would include software for data processing, visualization and map/chart drawing. IOC-EU/MAST-WDC (ICSU) and IAEA were invited to consider ways of support in co-operative implementation of this proposal.

The most interesting lectures in the information part of the Course were on the IOC/IODE programme, data models, the Internet, metadata, manganese nodules data and information, data control and correction, presentation of GEOLOGY, GEODAS, DSDP and ODP databases, and on data standards.

Participants addressed UNESCO/IOC and WDC-B, MGG to organize and implement a new course on MGG data management in the context of coastal zone and its mineral resources exploration. This new course must focus on the practical usage of new technologies: GIS, networks, CD-ROMs, the Internet, data archiving and saving, ORACLE products and integration systems.

Regarding the local arrangements, all participants agreed that WDC-B, MGG staff provided good conditions for fruitful training. The participants appreciated the excellent social events, which included sightseeing excursions and friendly parties.

## 6. CONCLUSIONS AND RECOMMENDATIONS

The Training Course was successfully completed in accordance with the programme and time-table. The success of the Course was attributed to the enthusiasm, high professional level and interest of trainees and lecturers. The Course went smoothly in the spirit of friendship and working collaboration. The programme of the second Training Course on Marine Geological and Geophysical Data Management was very useful for participants and was considered as a strong support to the "Floating University" training programme in the area of data collection, processing and usage.

It was recommended that more courses on the MGG data and information management should be organized by IOC Member States in support of national and regional activities. The merging of theoretical lectures, practical exercises and on-board training was considered as very useful. It was pointed out that more time in the next course programme should be devoted to practical training with the usage of new technologies.

There was a general opinion that the Course would facilitate the MGG data collection and exchange in and among data centres of IOC Member States of the region and will help to establish closer contacts between data centres and managers.

## 7. WRAP-UP

The Training Course on Marine Geological and Geophysical Data Management was closed on 19 September 1997. At the closing ceremony, Dr. Shcherbakov congratulated the participants who successfully completed the Course and thanked lecturers, instructors, IOC/UNESCO, EU/MAST, IAEA and BSEP GEF for their co-operation in supporting the Training Course. He expressed hope that the knowledge and experience acquired by participants during the days of the Course will be utilized at home and that the collaboration and friendship of the participants will continue.

The participants thanked the local organizers for the provided facilities and expressed their satisfaction with the support and hospitality.

Before closing the Course, Dr. V. Shcherbakov awarded all participants with the certificates signed by the IOC Executive Secretary and the Director of WDC-B, MGG, indicating the successful completion of the Course ( Annex III).

## ANNEX I

## PROGRAMME AND TIMETABLE

**8 September 1997**

10:00-11:00 Official opening and administrative arrangements.

11:00-12:40 International Co-operation in Oceanographic Data Exchange: IOC/IODE System - Today and Tomorrow.
Place and Role of WDCs, MGG and Oceanography in the ICSU WDC System: Future of the MGG Data and Information System.

14:20-17:00 MGG Data Standards and International Information Fund. National Programme "World Ocean" of the Russian Federation.
Oceanographic Data and Information: Integrated Approach to Marine Data Management for Research and Practical Applications.
IOC Regional Programmes in Black and Caspian Seas, Data Collection and Management Problems.

**9 September 1997**

09:00-12:40 Black Sea Environmental Program: Data and Information Management.
Black Sea GIS Models.
NMGDC-WDC B, MGG: Aims, Tasks, Functions, Data and Information, Technology.
Integrated State Bank of Digital Geological Information of the Russian Federation.

14:20-18:00 Oceanographic Data and Software Products of IOC/IODE and Other Programmes.
Application of Ocean Data CD-ROM's and Software Demonstration.
Composition and Structure of Marine Data: Geology, Geophysics, Geochemistry and Geo-ecology.

**10 September 1997**

09:00-12:40 Geographical Information Systems (GIS) Technology in Geological Survey.
GIS Technology Demonstration.
General Scheme and Methods of MGG Data Collection during Expeditions.
Collection and Recording of the General Prospecting Information. Types of Reports. Metadata.

14:20-18:00 Collection and Recording of the Marine Geophysical (Bathymetry, Magnetic and Gravity) Data.
MGD-77 Format.
Collection and Recording Data and Information on Geological Stations, Drilling Holes and Points of Observations. Age of Rocks and Sediments.
Drilling Holes, Stations and Points of Observations in Different Databases.

**11 September 1997**

09:00-12:40 Types of GIS-technology Products: Digital Geological and Mineral Resources Maps of Russian Federation Territory and Exclusive Economical Zone, Basic and Thematic Maps.
GIS Maps Demonstration. Collection and Recording of the Geological Sections and Rock Description Data.
Geological Classifications and Descriptions in Different Databases.

14:20-18:00 Marine Radioactivity Monitoring and Data Collection.
GEODAS System of Storage and Retrieval of Bathymetry, Magnetic, Gravity and Navigation Data.
Usage of the GEODAS System and Software.

**12 September 1997**

09:00-12:40 Sediment/Rocks Data Collection and Recording, Gas and Water Chemical Composition.
Geochemical Information in Different Databases.
Behaviour of Radionuclides in the Black Sea Environment.

14:20-18:00 Geo-technical and Petro-physical Data Collection and Recording.
Registration, Storage and Usage of Multibeam Echo sounder Data.
Bathymetry Databases of the World Ocean - GEBCO '97.
Digital Bathymetry Maps.
Demonstration of the Digital Bathymetry Data and Information.

**13 September 1997**

09:00-12:40 Marine Geological and Geophysical Databases Development and Management.
Demonstration of the Marine Geological Databases Management Systems.
Data of Organic Matter and Hydrocarbon Composition, Content of Bitumoides.
Deep Seismic Sounding Data. Recording, Holding and Searching.
Input and Database Formats of Hydrocarbon and Seismic Sounding Data.

14:20-17:00 Applications of Radiotracer Techniques to Geophysical and Sedimentological Studies in the Black Sea.
Computer Processing of Marine Radioactivity and Radiotracer Data, Databases and Models.

**14 September 1997** - Day off

**15 September 1997**

09:00-12:40 Remote-sensed Data and Information for Geological Investigations of Aquatories.
Remote-sensing Data and Images through Computers.
Recording of Profiles Results and Data of Seismic Studies: ODP, Seismo-acoustics, Well Acoustic Logging.
Seismic Data Processing and Archiving.

14:20-18:00 Collection, Recording, Holding and Usage of the Results of the Manganese Nodules, Crusts and Sulphide Research.
Measurement, Registration and Processing of Heat Flow, Kappametry and Radiometry Data.
Photo and TV Data Registration, Processing and Holding.

**16 September 1997**

09:00-16:30 On-board training

**17 September 1997**

09:00-16:30 On-board training

**18 September 1997**

| | |
|---|---|
| 09:00-12:40 | Collection and Recording of Geo-ecology Data.<br>Quaternary History of the Black Sea.<br>The System of Marine Geology, Geophysics and Geochemistry Databases.<br>DSDP/ODP Databases.<br>Sea-shore Data Collecting and Processing. |
| 14:20-18:00 | Data Input, Pre-processing, Quality Control.<br>Geophysical Results in Central Part of the Indian Ocean.<br>Introduction to the Internet System.<br>Internet System Demonstration. |

**19 September 1997**

| | |
|---|---|
| 09:00-12:40 | How to Prepare Internet WWW "Homepage".<br>Marine Geological and Geophysical Data and Information in the WWW Internet.<br>Preparing, Systematization, Storage and Usage of Geological and Primary Data Collections.<br>MGG Data METABASE.<br>Digital Geological, Geophysical, Geochemical and Special Maps of the World Ocean on the Basis of Databases. |
| 14:20-17:00 | Development and Future of the MGG Data and Information System.<br>Round-table: Final Discussions, Course Evaluation, Closing Ceremony. |

# ANNEX II

## LIST OF PARTICIPANTS

### TRAINEES

Dr. Gopala RAO
National Institute of Oceanography
Dona Paula 403 004
Goa
INDIA
Tel: <91> (0) 832-231470
Fax: <91> (0) 832-221360
E-mail: gopalrao@csnio.ren.nic.in

Dr. Kolluru Sree KRISHNA
National Institute of Oceanography
Dona Paula 403 004
Goa
INDIA
Tel: <91> (0) 832-226253
Fax: <91> (0) 832-223340
E-mail: krishna@csnio.ren.nic.in

Mr. Givi TUMANISHVILI
Dept. of Geology of Georgia
24, Mosashvili str.
Tbilisi 380062
GEORGIA
Tel: <7> (8832) 224040
Fax: <7> (8832) 225613

Ms. Cristina NENCIU
Romanian Marine Research Institute
300 Mamaia blvd. RO-8700
Constantza-3
ROMANIA
Tel: <++4> (041) 650870
Fax: <++4> (041) 831274
E-mail: cnenciu@alpha.rmri.ro

Dr. Aristomenis KARAGEORGIS
National Centre for Marine Research
Institute of Oceanography
Agios Kosmas, GR-166
04 Hellinikon - Athens
GREECE
Tel: <+30> (1) 9653304
Fax: <+30> (1) 9653522
E-mail: ak@erato.fl.ariadne-t.gr

Mr. Alireza AMRIKAZEMI
Iranian National Oceanography Centre
Meradj str., Azadi sq.
Tehran
IRAN
Tel: (9821) 6012923
Fax: (9821) 6009338
E-mail: 104361.2554@compuserve.com

Mr. Sabri KARA
Dept. of Navigation, Hydrography & Oceanography
Cubuklu
Istanbul 81647
TURKEY
Tel: <9> (0216) 3222580
Fax: <9> (0216) 6009338
E-mail: shod.d@servis.net.tr

Mr. Deltcho SOLAKOV
Institute of Oceanology Bulgarian Academy of Sciences
Dept. of Marine Geology
P.O. Box 152
Varna
BULGARIA
Tel: <+359> (52) 772038
Fax: <+359> (52) 774256
E-mail: office@iobas.io-bas.bg

Dr. Stanislaus OLSHTYNSKY

Institute of Geological Sciences
National Academy of Sciences of Ukraine
Dept. of Marine Sedimentology
55b, Oles Gonchar str.,
Kiev 252054
UKRAINE
Tel: <380> (44) 2210730
Fax: <380> (44) 2169334

Mr. Vladimir SEKACHEV
Chart Division of the NAVY
Electronic Navigation Charts
2, Atamanskaya str.
St. Petersburg 193167
RUSSIA
Tel: <7> (812) 2778409

Mr. Gabriel ION
National Institute of Marine Geology & Geo-ecology
23-25 D. Onciul
Bucharest 70318
ROMANIA
Tel: <40> (1) 2505512
Fax: <40> (1) 2502594
E-mail: gabi@rolink.iiruc.ro

Mr. Akmamed SAPARMURADOV
State Corporation of Turkmen Geology
7, Kosaeva str.
Ashgabad
Turkmenistan
Tel: <7> (3632) 356074

Dr. Sergey BALIASNIKOV
State Scientific-Research Navigation
Hydrographic Institute of MD RF
Scientific-Research Oceanographical Centre
41, Kozhevennaia str.,
St. Petersburg 199106
RUSSIA
Tel: <7> (812) 2173518
Fax: <7> (812) 2173319
E-mail: geoinf@geoinform.spb.su

Mr. Victor NEDELSKY
Expert, CMGD
29-25 Gajydara str.,
Novorossyisk 353912
RUSSIA
Tel: <7> (86134) 2 32 72

**LECTURERS**

Dr. Iouri OLIOUNINE
Deputy Executive Secretary
IOC/UNESCO
1, rue Miollis
Paris 75015
FRANCE
Tel: <33> (1) 45 68 39 63
Fax: <33> (1) 45 68 58 12
E-mail: i.oliounine@unesco.org

Dr. Vladimir MAMAEV
Black Sea Environmental Programme
Global Environment Facility
Black Sea Programme Co-ordination Unit
Dolmabanche Saray II Harekat Kushku
80680 Beshiktash
Istanbul
TURKEY
Tel: <90> (212) 227 9927/8/9
Fax: <90> (212) 227 9933
E-mail: blacksea@dominet.in.com.tr
vmamaev@dominet.in.com.tr
Homepage: http://www.domi.invenis.com.tr/blacksea

Dr. Nikolai MIKHAILOV
Head, Russian Federation NODC
6, Koroleva str.
Obninsk 249020
RUSSIA
Tel: <7> (08439) 2 59 07
Tel: <7> (095) 255 22 25
E-mail: nodc@storm.iasnet.com

Dr. Valeri SHCHERBAKOV
Director, World Data Centre B for Marine Geology & Geophysics
38, Krasnogvardeiskaya str.
Gelendzhik, Krasnodar Region
RUSSIA
Tel: <7> (86141) 2 45 82
Fax: <7> (86141) 2 44 91
E-mail: postmaster@cmgd.kuban.su
Internet: wdcbs20.sea.ru (194.87.190.227)

Mrs. Leora SHCHERBAKOVA
Expert, World Data Centre B for Marine Geology & Geophysics
38, Krasnogvardeiskaya str.
Gelendzhik, Krasnodar Region
RUSSIA
Tel: <7> (86141) 2 45 82
Fax: <7> (86141) 2 44 91
E-mail: postmaster@cmgd.kuban.su
Internet: wdcbs20.sea.ru (194.87.190.227)

Dr. Areg MIGDISOV
Chief of Laboratory,
Institute of Geochemistry of RAS
19, Kosiygina str.
Moscow
RUSSIA
Tel: <7> (095) 939 70 84

Ms. Elena SVIRILINA
Deputy Director
World Data Centre B for Marine Geology & Geophysics
38, Krasnogvardeiskaya str.
Gelendzhik, Krasnodar Region
RUSSIA
Tel: <7> (86141) 2 45 82
Fax: <7> (86141) 2 44 91
E-mail: postmaster@cmgd.kuban.su
Internet: wdcbs20.sea.ru (194.87.190.227)

Mr. Youri SERIKOV
Deputy Director
World Data Centre B for Marine Geology & Geophysics
38, Krasnogvardeiskaya str.
Gelendzhik, Krasnodar Region
RUSSIA
Tel: <7> (86141) 2 45 82
Fax: <7> (86141) 2 44 91
E-mail: postmaster@cmgd.kuban.su
Internet: wdcbs20.sea.ru (194.87.190.227)

Dr. David DIVINS
Research Associate
National Geophysical Data Centre
Marine Geology & Geophysics Division
WDC-A, MGG, NOAA E/GC3
325 Broadway Boulder,
Colorado 80303
USA
Tel: <1> (303) 497 65 05
Fax: <1> (303) 497 65 13
E-mail: dld@rimmer.ngdc.noaa.gov

Dr. Vladimir KURENNOY
Chief Scientist
Institute VSEGINGEO, p. Zeleny, VSEGINGEO
Moscow Region
RUSSIA
Tel: <7> (095) 521 65 87
E-mail: gena@hydrogeo.msk.su

Mr. Vladimir LOBANOV
Expert, Main Computer Centre
Russian Federation Geological Survey
32A, Tuhachevskogo str.
Moscow, 123585
RUSSIA
Tel: <7> (095) 192 80 18
Fax: <7> (095) 192 96 98
E-mail: wdcbmgg@glavnivc.msk.ru

Dr. Igor BALABANOV
Director, North Caucasus Ecological Centre
3, Pasechnaya str.
Sochi 354068
RUSSIA
Tel: <7> (8622) 94 76 45
Fax: <7> (8622) 94 76 45

Dr. Andrei MOURAKHINE
General Director, Firm “DIGESTA” of.127
13/2, Festivalnaya str.,
Moscow 135565
RUSSIA
Tel/Fax: <7> (095) 458 86 43

Mr. Oleg VOITSEKHOVITCH
Deputy Director
Ukrainian Hydrometeorological Institute
37, Nauki av.,
Kiev 252028
UKRAINE
Tel: <380> (44) 265 11 30
Fax: <380> (44) 265 53 63
E-mail: voitsekh@vai.vedos.kiev.ua

Mr. Vladimir BELOKOPYTOV
Head of Laboratory
Ukrainian Hydrometeorological Institute
Marine Information Scientific Dept.
61, Sovetskaya str.,
Sevastopol 335011
UKRAINE
Tel: <380> (692) 52 30 30
Fax: <380> (692) 52 31 50
E-mail: golubev@omin.sevastopol.ua

**ANNEX III**

**TRAINING COURSE CERTIFICATE**

**THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION OF UNESCO**
**AND**
**WORLD DATA CENTRE "B" FOR MARINE GEOLOGY AND GEOPHYSICS**


**This is to certify that**

**NAME**
**(COUNTRY)**

**attended and successfully completed**
**the Training Course on Marine Geological**
**and Geophysical Data Management**
**organized with the support**
**of the IOC/UNESCO, European Union, MAST Programme, IAEA**
**at the World Data Centre B for MGG**
***Gelendzhik, Russia***
***8 - 19 September 1997***

SIGNED:

Dr. Gunnar Kullenberg
Executive Secretary
Intergovernmental Oceanographic
Commission, UNESCO
Paris, France

SIGNED:

Dr. Valery S. Shcherbakov
Director, World Data Centre B
for Marine Geology & Geophysics,
Gelendzhik, Russia

## ANNEX IV

## LIST OF ACRONYMS

| | |
|---|---|
| BSEP | Black Sea Environmental Programme |
| CRP | Co-ordinated Research Programme |
| DSDP | Deep Sea Drilling Project |
| ERS | European Remote-sensing Satellite |
| EU | European Union |
| GDA | GEBCO Digital Atlas |
| GEBCO | General Bathymetric Chart of the Oceans |
| GEF | Global Environment Facility |
| GEODAS | Geophysical Data System |
| GIS | Geographic Information System |
| GPS | Global Positioning System |
| IAEA | International Atomic Energy Agency |
| IBCM | International Bathymetric Chart of the Mediterranean |
| ICSU | International Council of Scientific Unions |
| IHO | International Hydrographic Organization |
| IOC | Intergovernmental Oceanographic Commission |
| IODE | International Oceanographic Data & Information Exchange |
| MGG | Marine Geology & Geophysics |
| NGDC | National Geophysical Data Centre (USA) |
| NMGDC | National Marine Geophysical Data Centre (USA) |
| NOAA | National Oceanic Atmospheric Administration (USA) |
| NODC | National Oceanographic Data Centre |
| ODP | Ocean Drilling Programme |
| PC | Personal Computer |
| RAS | Russian Academy of Science |
| STD | Salinity, Temperature, Depth Probe |
| UNESCO | United Nations Educational, Scientific & Cultural Organization |
| WDC | World Data Centre |
| WWW | World Wide Web |