IOC ADVISORY MISSION REPORT

10

MISSION TO GEORGIA ON IOC/IODE MATTERS

Report of the IOC Advisory Mission to
The Republic of Georgia
6 - 10 March 2000

Distribution

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1. BACKGROUND

By the letter of 6 January 2000 from Georgia, the Executive Secretary IOC was invited to send an IOC/IODE mission to Georgia in the Spring of 2000 with the goal to formulate a proposal for the establishment of the marine data and information management infrastructure in the region.

In response to this request, an IOC mission visited Georgia from 6-10 March 2000, consisting of Dr. E. Balopoulos (Greece, Director of the Hellenic National Oceanographic Data Centre, Vice-Chairman of the IOC Committee on IODE) and Dr. I. Oliounine (IOC, Deputy Executive Secretary). The mission was funded by IOC.

The mission had the opportunity to visit the Tbilisi University, Hydrometeorological Service of Georgia, the Parliament of Georgia and some other national institutions which could become potential partners in the collection of data and in the operations of a data centre. A programme of the visit is attached to the mission report.

2. OBJECTIVES OF THE MISSION

Bearing in mind the request from Georgia for assistance in establishing a national marine data and information management infrastructure, the following objectives were set before the Mission:

- to assess the state of marine data holdings;
- to identify and specify the needs for Georgia as regards to marine data and information;
- to recommend national infrastructure for marine data management and exchange;
- to identify the ways in which IOC can assist the country in the data collection and management.

3. SCOPE AND LIMITATION OF THE REPORT

This report provides an assessment of the present status of marine data and information gathering systems and of the data management infrastructure in Georgia. It also attempts to identify national needs and ways for developing an improved infrastructure for marine data, information collection and management. The conclusions of the report are based on consultations with relevant national authorities, institutions and agencies, both as data and information collectors, managers and users. Unfortunately, the shortage of time did not give an opportunity to visit relevant institutions in other cities than Tbilisi. Finally, the report provides recommendations for the development of an adequate system for the appropriate collection and management of oceanographic and coastal zone data and information. It is expected that the results of this study may also prove useful to the local authorities for planning their activities related to the marine and coastal zone monitoring, management and protection.

4. RESULTS OF THE MISSION

The Georgian Black Sea coast has a total length of approximately 315km and is located in the east of the Black Sea, between the mouths of the rivers Sarpi and Psou (Figure1). There are approximately 150 rivers discharging into the Georgian Black Sea with a total annual inflow of $40.2km^3$ and a total drainage basin of $32.6km^2$ (Georgian Soviet Encyclopaedia, 1981). These influence, to a great extent, the coastal geomorphology and environmental conditions of the coastal waters.

There are seven cities and five towns along the Black Sea coast. To the south, Batumi is one of the largest cities of Georgia and an important industrial centre. In addition to an oil refinery, it has shipyards, engineering (food-processing equipment and consumer goods) and pharmaceutical plants, food-processing factories and light industry. It is also one of the largest Black Sea ports, of which oil products comprise the majority of its cargo traffic. In the central section of the Georgian coastline the port of Poti is located, which is one of the oldest ports in the world and can trace its history back to the time of the Argonauts. Poti is a large industrial centre with engineering (shipbuilding, hydro-mechanics, electrical amplifier plants), construction (cement plant) and food-processing (wine distillers, bakeries, slaughterhouse and tea plant) industries. To the north, Sukhumi is the largest urban area without a particularly large industrial activity.

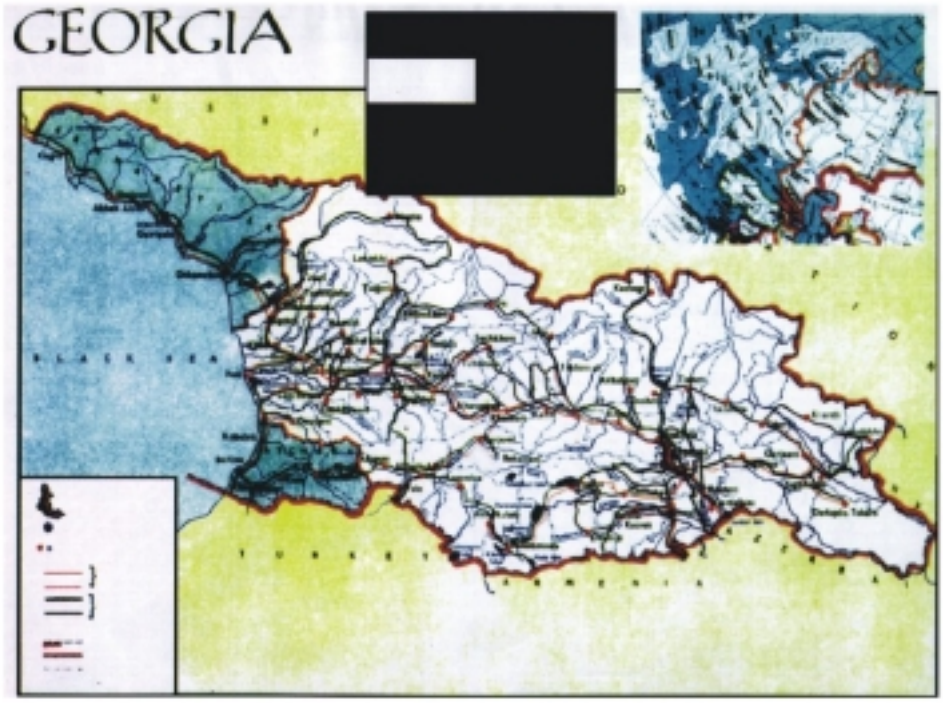

Figure 1

The mission visited numerous Georgian institutions in Tbilisi which carry out different activities related to marine science, ocean and coastal zone management, and met experts from these and other institutions who provided valuable information on the status and plans for marine data collection and management in their organizations. In addition, a number of published documents/reports were made available to the Mission, which were useful in identifying data sources.

The information presented below gives, in general, a reliable description of the status of national ocean data holdings.

The information is arranged on an institution-by-institution basis for easy reference.

4.1 GEORGIAN HYDROMETEOROGICAL DEPARTMENT

Hydrometeorological measurements in the coastal zone of Georgia go back to the 19th Century. A network of 8 coastal stations was monitored and long time-series of observations have been collected. Most of the data and meta-data of the above measurements have been stored at the Institute of Oceanology, in Sevastopol and only a part of them (mainly after 1964) are kept in Georgia (Batumi).

An important factor that is greatly influencing marine environmental conditions in the eastern-most coastal region of the Black Sea is the existence of numerous large and small rivers which drain the Georgian mainland and discharge into the Black Sea. As many of the rivers receive domestic sewage waters, as well as industrial and agricultural effluents, they are heavily polluted. Transporting their pollutants in the Black Sea greatly affects the marine water quality, especially in the coastal area. Hydrological observations in the river systems of Georgia started in 1900 with a network of 36 stations. This network today includes more than 70 stations.

The Georgian Hydrometeorological Department (GHD) is the responsible agency for carrying out hydrological and meteorological observations. Its activities include measurements carried out in:

(i) river systems, which drain the Georgian mainland and discharge into the eastern Black Sea;
(ii) the Georgian coastal waters; and
(iii) the offshore waters.

Hydrometeorological observations in the open sea waters of Georgia started in the 1960's with the use of the research vessel '*NAUKA*', and ships-of-opportunity. Parameters measured include air temperature, wind speed and direction, sea-surface temperature and occasionally currents and chemical parameters related to the study of water pollution (e.g., hydrocarbons, synthetic surface-active substances, phenols, pesticides, etc.) Most of the data have been stored in Sevastopol (Ukraine) and part of them (especially current data) in Obninsk (Russia).

The National Environmental Monitoring Centre (NEMC) of the GHD is responsible for the protection and quality of coastal waters. The NEMC monitors hydrochemical conditions in major rivers and the level of their discharges into the Black Sea. Hydrochemical measurements, including those of organoleptical parameters, biogens ($N\text{-}NH_4$, $N\text{-}NO_2$, $N\text{-}NO_3$, phosphates, silicates), elements (K, Na, Ca, Mg, Cu, Zn, Pb, Hg, As), oil products, phenols, surface active synthetic substances, dissolved oxygen BOD_5, COD, etc., are mainly carried out in ten rivers (Table 1). For almost all rivers, concentrations above the internationally accepted standard levels are measured for COD, $N\text{-}NH_4^+$, $N\text{-}NO^2$ and phosphates. In a few cases, values above the international standard levels are also found for BOD_5, phenols and oil products.

Table 1

River	Length Km	Drainage Basin km^2	Mean Annual Discharge m^3s^{-1}	Data Period
Chorokhi	438,0	22.100,0	159,00-409,00	1940-1992
Bartskhana	8,8	19,0	1,08	1976-1992
Korolistskhali	13,0	52,0	3,33	1983-1992
Kubistskhali	6,6	6,6	1,71	1976-1992
Kintrishi	45,0	291,0	17,30	1987-1992
Natanebi	67,o	498,0	33,50	1967-1992
Supsa	117,0	1.106,0	514,00	1940-1992
Rioni	327,0	13.418,0	409,00	1973-1999
Khobi	150,0	1.340,0	50,50	1966-1991

The data collected by NEMC constitute an important dataset useful for monitoring coastal waters and for planning coastal zone development. These data are now preserved in hard copy form (paper). In order to improve its abilities to respond effectively to the user's needs, the NEMC/GHD has to acquire the following equipment:

- Portable equipment - AQUA 16 system for CTD Redox and DO,
- Equipment for nutrients' photoelectric colorimeter,
- PC Computer Pentium III, UPS, printer

4.2 TBILISI STATE UNIVERSITY

Several departments of the Tbilisi State University are carrying out research related to the marine environment and the coastal zone of Georgia. The research activities of the **Department of Geology and Oceanology** are focused on the study of processes in the Black Sea, which have been developed under global warming of climate and also on the impact of these processes on a biologically active layer of the sea. The Department is also working on the change of ecological conditions in the Georgian coastal zone (Gigineishvili *et. al.*, 1999). This Department holds two important datasets. The first contains long-term time series of sea-level changes. The data (two measurements per day) have been collected at two coastal stations (Batumi, Poti) and cover the period 1873-1996. The second dataset consists of sea-surface temperature measurements (one measurement per day) collected during the period 1925-1995 at four coastal stations in Batumi, Poti, Sukhumi and Gagra. The above-mentioned datasets are kept on hard disk and diskettes.

Other sections of the Tbilisi State University (e.g., Department of Geology, Chair of Cartography, Chair of Hydrology, Chair of Remote-Sensing of the Earth, GIS and Remote-Sensing Department) have data mainly related to river waters.

4.3 INSTITUTE OF HYDROMETEOROLOGY, GEORGIAN ACADEMY OF SCIENCES (HIGAS)

The Institute of Hydrometeorology of the Georgian Academy of Sciences (HIGAS) is responsible for carrying out marine ecological studies in coastal waters of Georgia. During the years 1985-1998, a monitoring programme was implemented at a network of six coastal stations, located in the discharge areas of large river systems. Within the framework of this programme, many different chemical parameters have been measured, including oil products (phenols, hexadecane, isooctane, etc.), pesticides, major ions (pH, Cl^-, $Ca2^+$, Mg^{2+}, HCO_3^-, FO^{3+}, Cu^{2+}), phosphates, trace elements (Ni, Cu, Mo, Ti, Mn, Fe). Data have been collected twice a month and during the summer on a daily basis till 1995. Since then and up to 1998, data collection is sporadic. Occasionally, and for inter-calibration purposes, water samples have been analyzed in two different laboratories, Batumi and Tbilisi.

Using long-term datasets of various chemical parameters for large rivers of Georgia collected by the Hydrometeological Department, the HIGAS has made an assessment of the role of seven main rivers of Georgia in the Black Sea pollution by different chemical components. There was also an estimate made of the contribution of various pollutants (e.g., industrial, agricultural and communal sewage water) to this pollution, which through the rivers are discharged into the marine environment. Other activities of HIGAS within the mission objectives are related to the study of the effect of oil products such as toxicants on fish organisms inhabiting the Black Sea. In the near future, HIGAS plans to participate in a fieldwork study of the forms and content of biogenic elements (particularly nitrogen) in the marine waters of Georgia.

The datasets held by HIGAS constitute a powerful basis for monitoring the quality of the coastal waters of Georgia. Due to the lack of modern computer facilities, the datasets of HIGAS are presently kept in hard copy (paper) form.

4.4 ENVIRONMENTAL COMMITTEE OF THE GEORGIAN PARLIAMENT

The Chairman of the Parliament Committee of the Environment Protection and Natural Resources of Georgia, Dr. K. Chitaia, informed the Mission of the plans for the transport of oil from the Caspian to the Black Sea. From the Sangachal seashore terminal in Azerbaijan the oil will be transported through the refurbished pipeline to the Georgian Black Sea coast. A new 90km section of the pipeline will be constructed to join the existing pipeline in the Georgia/Azerbaijan area. The terminal will be constructed on the left bank of Supsa river (Figure 2); from the terminal, oil will be loaded to tankers through the offshore loading facility (floating island), which already has been constructed (Khikhodze, 1997). The Georgian authorities have carried out an environmental impact assessment in accordance to established international standards. The establishment of a national marine data archive is considered of great importance for monitoring coastal waters and coastal protection, as well as for making administrative decisions, especially in case of accidental oil spills in the offshore loading facility.

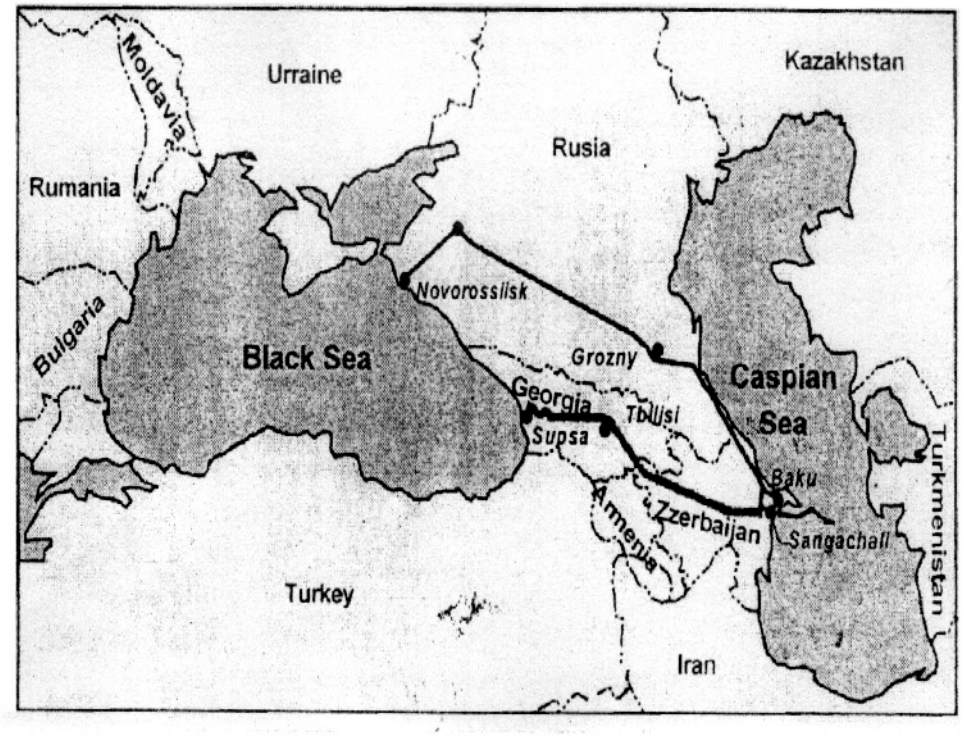

Figure 2

4.5 SCIENTIFIC RESEARCH INSTITUTE OF SEA COASTS DYNAMICS (SANDI)

The Scientific Research Institute of Sea Coasts Dynamics (SANDI) has the responsibility for carrying out research related to the coast dynamics and morphology problems. The Institute has also gained experience in undertaking scientific research in other countries like Russia, Turkmenistan, Bulgaria and Cuba. Today, scientific research is conducted in two coastal laboratories of the Institute, which are located in Poti and Batumi.

Although the Institute was formed in 1981, the observation materials cover the period since 1973. Unfortunately, some materials of the past years were lost in the 1990's. The data and scientific information holdings of the Institute include:

- scientific reports on paper;
- cartographic data of submarine slope (by separate sections of different years);
- data on river-mouth dynamics;

- data on submarine canyons and coastal zone dynamics;
- data on geomorphology and paleogeography;
- data on lithology of the coastal zone, geology and grain composition;
- data on the prognoses of the coastal zone dynamics taking into account the modern rise of the sea-level during the last several years.

For protecting data and information and keeping a systematic archive, SANDI has the need for the following equipment:

- Computer Pentium III, with monitor 17",
- Printer or plotter - A0,
- Printer A4,
- Scanner HRS PRO (Slide module),
- Digitizer,
- CD Writer,
- Motorola system (equipment for survey together with echo sounder - work depth to 300m) - 2 specimen for the two laboratories,
- Laser total station.

The above equipment will also help to improve and extend the scientific research activities of the Institute.

4.6 INSTITUTE OF GEOPHYSICS, GEORGIAN ACADEMY OF SCIENCES (IGGAS)

The Department of Marine Dynamics (DEMADY) of the Institute of Geophysics of the Georgian Academy of Sciences is specializing in numerical modelling of physical and dynamical processes in the Black Sea (Demetrashvili and Kordzadze, 1996; Kordzadze, 1996). They have also developed numerical models for the Caspian Sea and are now making an effort to develop a three dimensional model (ocean-atmosphere) for the Mediterranean Sea. To run their models, the DEMADY/IGGAS is using sea-surface temperature and salinity, as well as meteorological (mainly air temperature) data obtained from various sources. At the same time they produce large datasets, as a model output. Since most of the data they are using are old, the Institute expressed interest to have recent oceanographic (sea temperature and salinity) and meteorological (air temperature and wind speed and direction) data for the areas of their scientific interest. They also expressed the need for an advanced computer system, which will enable them to perform numerical experiments better (Computer Pentium III: 500/RAM 256 MB/HDD 10,2 GB/VC, 8MB/CD-ROM, CD-RW, Modem, Keyboard, 17" Monitor).

4.7 GEORGIAN SCIENTIFIC RESEARCH INSTITUTE OF FISHERIES AND ECOLOGY, AND THE INSTITUTE OF ZOOLOGY AND BOTANY, GEORGIAN ACADEMY OF SCIENCES

The institutes have collected marine biological data in the Georgian Black Sea waters and carried out scientific research (UNESCO, 1992) since the beginning of the 20th Century. Phytoplankton sampling has been carried out during the years 1982-1987 at a network of 24 stations (Figure 3). There are also limited zooplankton data collected during 1933-34. Seasonal data on the abundance and biomass of zooplankton have also been obtained in the southern part of the Georgian Black Sea during 1984-1985. The zoobenthos is one of the most thoroughly studied components of the Georgian Black Sea ecosystem. An important dataset has been collected during 1978-1982 at various depths along 13 transects. There is also a dataset on icthyofauna biodiversity (collected by trawling and fixed nets).

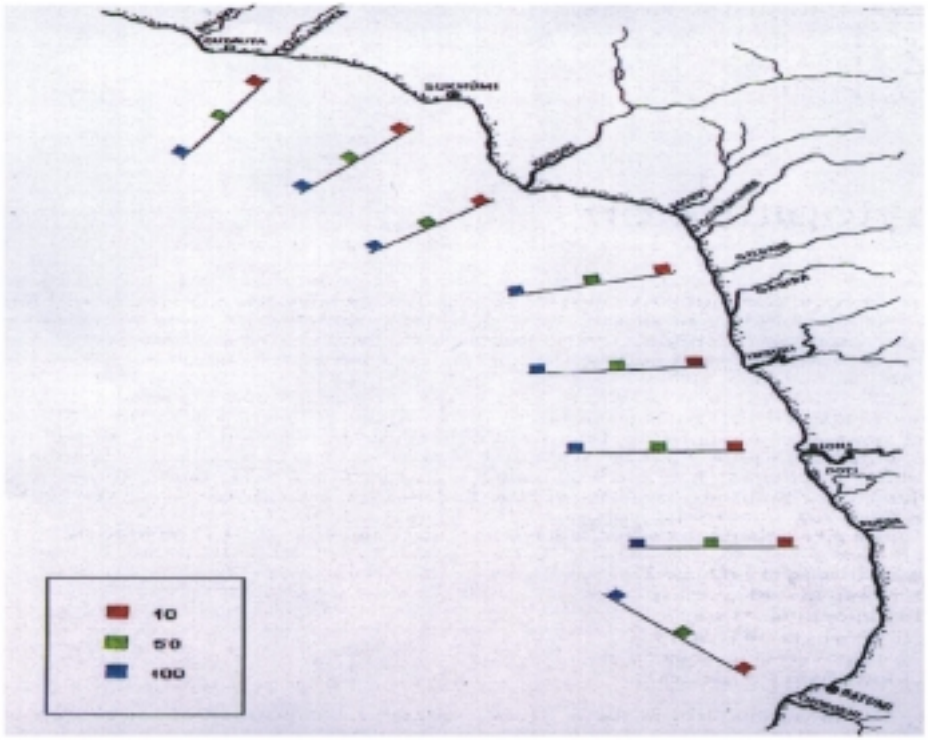

Figure 3

5. CONCLUSIONS AND RECOMMENDATIONS

The collection of marine data on a regular basis and scientifically based data management has not yet started in Georgia. However, the interest to have marine data to meet national needs in coastal area protection, in climate change and marine pollution studies and in ships operation is very high. These needs pushed Georgia to start thinking seriously about the establishment of the marine data and information management infrastructure. Today, all those whom the mission met consider it as an urgent necessity. That is why the mission was considered as timely.

The immediate positive result of the mission was an increased awareness of IOC and its IODE. The IODE internationally agreed data policy was considered as an effective instrument to meet national and regional needs.

The mission identified at least four national institutions that are ready, or potentially ready to contribute to the future data centre. They are the Hydrometeorological Service, Tbilisi State University, the Hydrometeorological Institute of the Academy of Sciences and the Scientific-Research Institute of Sea Coasts Dynamics. There is also a number of other institutions which may become contributors and partners of the future data management facility.

It was recognized that a centralized information and database system is needed. The existence of such a facility will help avoid duplication of efforts, will be able to provide better services and as a result will save financial and human resources.

It was further recognized that a centralized information and database system capable of processing, archiving, analyzing and disseminating information about a Black Sea area of interest to Georgia would be in the interest of all users, both in the private and public sectors.

Finally, the mission recognized that the integrated coastal zone management is of the utmost importance to Georgia and that at the first stage the focus might be on the reconstruction of the data collection system and on the construction of the database to assist the activities in the coastal zone, its protection and development.

Based on the above mentioned conclusions the mission recommended that:

(i) a Designated National Agency (DNA) be identified with the facilities for data collection, processing and archiving for a certain type of data (physical, chemical and biological, dynamics and pollution). This agency will also play a role of a referral centre for other types of data (e.g., coastal erosion, marine meteorology, marine geophysics, numerical modelling, etc.);

(ii) the DNA should, be equipped, as a minimum, with the following hardware and software:

Hardware: Pentium PC III 500 MHz, RAM 128 Mb, Hard Disk IDE 20 GB, Screen adapter 16 Mb RAM, Monitor 17", 40x CD-ROM, Backup zip drive, sound card, Microphones, mouse, pad, keyboard, HP inkjet printer.

Software: WINDOWS ’98, MS-OFFICE 2000, QC-MED, ARC/View, Ocean-PC, IODE resource kit, software for transcoding oceanographic data in internationally used formats (e.g., MEDAR/MEDATLAS format).

Staff: At least two scientists, who should be advanced computer users and with a good knowledge of the basis of oceanography and data processing. A short-term (2-4 months) on the job training in an advanced NODC should be arranged for scientists to get them acquainted with modern techniques of data management.

(iii) Creation of such an agency should be supported at the governmental level and the effective co-ordination at all national levels be established. All marine data producers will commit themselves to provide data to a central facility or keep the DNA informed on all changes in their respective databanks.

(iv) Responsibilities of the DNA when established will include:

- assembling a certain number of data types with easy access and retrieval;
- implementing internationally recommended quality control procedures;
- updating the data bank and monitoring national data flow;
- archiving data in a intentionally agreed format, and establishing conditions for data safety;
- meeting users needs and requirements for data sets and other products;
- participating in the IODE system.

(v) The IODE National Co-ordinator be formally associated with the DNA, so as to be in a position to fulfil his functions and duties effectively.

(vi) The DNA, as soon as established, approach the IODE centres in and outside the region with the request to provide the agency with the copies of datasets available for the areas of Georgian interests.

(vii) Urgent action should be taken to develop an inventory of available national datasets. The lists of the needs in data collection and processing be identified and transferred to IOC/UNESCO with a request for support.

(viii) The MEDAR/MEDATLAS products be available to Georgian Institutions.

(ix) Closer contacts be established with private industries and collaboration with them be achieved in order to use their facilities for marine data collection.

(x) Any official request for support in acquiring software and hardware, in organizing training or getting fellowships should go through the National Oceanographic Committee, which will identify priorities in accordance with national needs.

(xi) The Georgian Delegation participate at IODE-XVI which will give an unique opportunity to get closely acquainted with the IODE system and establish necessary links with other oceanographic centres.

(xii) Georgian scientists be invited to participate in IOC scientific programmes being implemented in the Black Sea and adjacent marine areas.

6. REFERENCES

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7. ACKNOWLEDGEMENTS

The Mission received a friendly welcome and its success was to a big degree due to the efforts of the Chairmen of the NOC of Georgia, Prof. Ihraklii Chomeriki, and Prof. G.S. Metreveli and of the IODE National Co-ordinator, Prof. K. Bilashvili. The members of the Mission are very thankful to Mr. P. Metropolis, Secretary-General of the National Committee of Georgia for UNESCO and to

the Dr. K. Chitaca, Head of the Parliament Committee for Environment. Finally, the members of the Mission would like to thank all the people they met for providing information and assistance in meeting the mission's objectives.

ANNEX I

MISSION ITINERARY

March 4, Saturday	- Arrival in Tbilisi of Dr. E. Balopoulos, meeting at airport, accommodation.
March 5, Sunday	- Arrival in Tbilisi of Dr. I. Oliounine, meeting at airport, accommodation. Discussion of programme.
March 6, Monday	- Visit to the Tbilisi State University. - Meeting with the Rector of Tbilisi State University. - Visit to the Marine Data Management facilities of the Tbilisi State University, meeting with the professors and students of the Faculty of Geography and Geology & the Dept. of Cartography & Geoinformation. - Field visit.
March 7, Tuesday	- Visit to the State Hydrometeorological Dept. - Visit to the Parliament of Georgia. - Meeting with Chairman of the Georgian Commission for UNESCO.
March 8, Wednesday	- Seminar, lectures. - Round table discussions of the content & format of the report.
March 9, Thursday	- Preparation of the report.
March 10, Friday	- Adoption of the report. - Discussion of future co-operation with IOC.
March 11, Saturday	- Departure.

ANNEX II

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