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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

REPORT OF THE IOC CONSULTATIVE GROUP ON OCEAN MAPPING (CGOM) TO THE 20TH SESSION OF THE IOC ASSEMBLY, PARIS, 29 JUNE TO 9 JULY 1999

This document was approved at the Seventh Session of the
IOC Consultative Group on Ocean Mapping (CGOM)
Monaco, 12-14 April 1999

This Report is submitted to the IOC Assembly in accordance with Clause 1 of the Terms of Reference of the IOC Consultative Group on Ocean Mapping (CGOM).
It covers the period since the last report of the IOC/CGOM to the IOC Assembly (doc. IOC/INF-1063 dated 2 May 1997), i.e. the period from April 1997 to April 1999.

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A. THE CONSULTATIVE GROUP

1. THE IOC CONSULTATIVE GROUP ON OCEAN MAPPING (CGOM)

1.1 TERMS OF REFERENCE

The Terms of Reference are laid down in the Annex to Resolution EC-XVII.3, of February 1984. They read as follows:

The Consultative Group on Ocean Mapping shall:

(1) keep under continuous review all ocean mapping activities of the Commission, reporting biennially to the Assembly on progress made with each ocean mapping project sponsored (or co-sponsored) by the Commission;

(2) facilitate the exchange of expertise and experience between the groups supervising each such project;

(3) provide a technical link between the groups supervising each such project, so as to ensure that a standard form of presentation is used for all ocean mapping products published by, or on behalf of, the Commission;

(4) encourage subsidiary regional bodies of the Commission to identify the requirements for bathymetric chart series and overlay (overprint) series showing other scientific parameters, including marine resources.

See also 1.4 below.

Membership: Chairmen (or their representatives) of all groups responsible for supervising ocean mapping projects sponsored (or co-sponsored) by the Commission.

The First Session of the IOC/CGOM was held in the International Hydrographic Bureau in Monaco, on 26 April 1985. Mr. Desmond Scott was elected Chairman, Professor Carlo Morelli Vice-Chairman.

1.2 MEETINGS

The 7th Session was held in the International Hydrographic Bureau, Monaco, from 12 to 14 April 1999 under the Chairmanship of Dr. Günter Giermann, Chairman CGOM.

1.3 COMPOSITION OF THE CONSULTATIVE GROUP

Members of the group are listed in Annex I.

1.4 PURPOSE OF CGOM (AS OF JULY 1997)

The following "Purpose of CGOM" was described in doc. IOC/INF-1063 of 2 May 1997 and accepted by IOC Resolution XIX-3 in July 1997:

The Commission has three main purposes:

(1) to act as a "chapeau" body for the IOC's Ocean Mapping Projects, so as to ensure a full exchange of knowledge on procedures and developments between the GEBCO and the regional projects;

(2) to ensure that common exchange format are used in the preparation of traditional paper chart series and for digitization (thus faciliting incorporation of regional products into the GEBCO Digital Atlas, GDA); and

(3) to prepare a biennial report on Ocean Mapping Project sponsored or co-sponsored by the IOC for submission to the Assembly.

This text does not replace the original Terms of Reference listed under Agenda item 1.1.

B. OCEAN MAPPING PROJECTS

2. GENERAL BATHYMETRIC CHART OF THE OCEANS (GEBCO) JOINTLY SPONSORED BY IHO AND IOC

See Assembly diagram in Annex II.

2.1 MEETINGS OF THE JOINT IOC-IHO GUIDING COMMITTEE FOR GEBCO

The 16th Session of the Guiding Committee was held at the Southampton Oceanography Centre (SOC), UK, 23-25 June 1997 (doc. IOC-IHO/GEBCO XVI/3 of 22 September 1997).

The 17th Session of the Guiding Committee will be held at the Bedford Institute, Halifax, Nova Scotia, Canada, 28-30 June 1999.

A meeting of the GEBCO Officers combined with a meeting of the GEBCO Sub-Committee on Digital Bathymetry (SCDB) was held at two venues in Wellington, New Zealand: the Institute of Geophysical and Nuclear Sciences Ltd and the National Institute of Water and Atmospheric Research, 12-17 March 1998 (doc. IOC-IHO/GEBCO Officers XI/3 of 20 June 1998).

2.2 GDA REPORT

By March 1998, 885 copies of the GDA had been sold/distributed to 500 Organizations and

individuals in 78 countries.

2.3 REPORT TO CGOM ON GEBCO INTERSESSIONAL ACTIVITIES

2.3.1 The Second Release of the GDA, in February 1997, was made free on condition that an accompanying questionnaire was completed.

The questions were arranged under six headings:

A.	Gridded Bathymetry	D.	Suggestions
B.	Shallow Water Bathymetry	E.	User Profile
C.	Paper Charts	F.	Mailing Addresses

Replies were received from 385 of the 636 holders of 1st edition. Questions were not sent to the GEBCO Community.

Answers confirmed what the GEBCO Community had expected. Firstly, there was an overriding demand for some form of latitude/longitude gridded product, with global coverage, nested/variable grids were requested by 68% of the respondents. Secondly, there was a strong demand (74%) for the inclusion of shallow water bathymetry with some calling for contours at 10m intervals, and thirdly, a small demand (13%) for a paper product.

Numerous ideas were received under Section D: Suggestions. These included: Closed polygons for coastlines and contours, provision of a Windows version and addition of polar projections.

The analysis of the User Profile (Section E) revealed some interesting statistics. Chief among these were that 89% of respondents are using the GDA on PCs, and for these, 80% export data from the GDA for use with other software packages. The most popular destination packages for exported data were: ArcView/ArcInfo (22%), Surfer (21%) and GMT (17%). Apart from home-grown software, another 41 proprietary packages were listed.

2.4 TOWARDS THIRD RELEASE OF GDA

This is planned for late 1999 and will include the following elements:

2.4.1 Bathymetric Data from New Maps in the following areas:

Indian Ocean
Ross Sea
New Zealand Waters
Canadian Waters, including Hudson Bay
US East Coast
Caribbean and Gulf of Mexico (US area of responsibility)
Hawaiian Waters
North Atlantic Ocean

South-Central Pacific Ocean

Additionally, the Chief Editors of the IBC Regional Mapping Projects have been asked to deliver validated maps to the GEBCO Bathymetric Editor.

2.4.2 Gridded Versions of GDA

Following the lengthy discussion in Wellington, and considering matters raised during the Intersessionary Period since March 1998, it is evident that the GEBCO Grid Task Group are facing some difficult problems. These are related to numerous issues, inter alia, the quality of contour data, lack of data on the continental shelves, incorporation (or otherwise) of satellite predicted bathymetry, and general strategies about updating and release procedures. There are no easy solutions or clear courses of actions that can be seen at present. Considerable debate is expected at the GEBCO Guiding Committee and SCDB in Halifax, June 1999.

2.4.3 Obtaining Data on the Continental Margins

Results from the GDA questionnaire demonstrated that the scientific community required the proposed grid to cover the continental margins. Following a recommendation, made at Wellington, the IHO sent a Circular Letter to Member States asking them if they were prepared to release data for use by GEBCO in the continental margins.

The response to the letter was generally favourable but some HOs raised concerns. GEBCO recognizes the need to press this matter further.

2.5 GEBCO WEB SITE

The recommendation to create a GEBCO Web Site was carried out in October 1998. The site includes a short history of GEBCO and hyperlinks to IOC, IHB, BODC, IBCWIO and IHO DCDB. More links to IBC sites will be added later.

Discussions about the further development of this site will take place in Halifax.

2.6 GEBCO GUIDELINES, PART 4 - MULTIBEAM ECHO SOUNDERS

Despite the upbeat statements at the 1997 CGOM, there is still some small tidying up required to complete this Guideline. Rear Admiral Guy hopes to have this completed by June 1999.

2.7 GENERIC NAMES REVIEW

The list of generic names, agreed at the 1997 SCUFN Meeting, was presented for approval by the GEBCO Guiding Committee. The list generated considerable debate. The Chairman ruled that although the bulk of the descriptions were accepted. Agreement on several difficult interpretations would have to be resolved through correspondence. It is hoped to have an agreed list of generic names for formal acceptance by the GEBCO Guiding Committee at Halifax.

2.8 SCOR WG 107 - IMPROVED GLOBAL BATHYMETRY

2.9 GEBCO CENTENARY

Mr. Desmond Scott reported that it had now been decided to celebrate the Centenary of GEBCO during the year 2003. The Group had already been informed (IOC/CGOM-VI/3, item 4.1.1) about the plans for two publications, an edited volume (ref: IOC-IHO/GEBCO-XVI/3, item 14 and Annex VIII) and a well written book directed towards the general public. Work on the former was well in hand. It has now been decided to hold a short two-day conference in Monaco during 2003 and preliminary plans for this were now being prepared for submission to the forthcoming session of the GEBCO Guiding Committee (GEBCO-XVII) in June. This would almost certainly be hosted with the Monegasque Government and with the collaboration of the International Geographical Union (IGU).

Other non-governmental bodies which had supported GEBCO over the years: The Scientific Committee on Oceanic Research (SCOR), and its Working Group 107: Improved Global Bathymetry; the International Association for the Physical Sciences of the Ocean (IAPSO) and the Commission for Marine Geology (CMG) were also being invited to collaborate and an approach would be made to the International Cartographic Association (ICA). Ing. Général Roubertou suggested that an invitation also be sent to the Fédération Internationale des Géomètres (FIG) - this was agreed.

3. INTERNATIONAL BATHYMETRIC CHART OF THE MEDITERRANEAN AND ITS GEOLOGICAL/GEOPHYSICAL SERIES (IBCM)

See Assembly diagram in Annex II.

3.1 MEETINGS OF THE EDITORIAL BOARD FOR IBCM

An Informal Consultation took place on board RV Sibiryakov in Monaco Harbour, 19-20 April 1997 (together with the 6th Session of CGOM) (doc. IOC/INF-1070 of 15 April 1998).

The 7th Session of the Editorial Board was held in Cavtat near Dubrovnik, Croatia, 2-4 June 1998 (doc. IOC/EB-IBCM-VII/3). Dr. John K. Hall was elected Vice-Chairman.

3.2 COMPOSITION OF THE EDITORIAL BOARD

The present membership of the Editorial Board is listed in Annex I.

3.3 BATHYMETRIC AND GEOLOGICAL/GEOPHYSICAL SERIES

IBCM originated from the need for bathymetric knowledge of the offshore waters of the Mediterranean, at a time (1960-62) when, as for most of the oceans, only sparse data often existed.

The initiative started from CIESM, IOC and FAO, with the aim of offering to the scientific community the data for the study and exploitation of the sea bottom and the Earth's interior.

The physiographic results were so outstanding that the initiative was extended to the connected geophysical and geological studies. The data were published in the 1:1M IBCM (1981) and its Geological/Geophysical Charts series (1989-1999), each with an illustrated pamphlet.

From the '80s, the improvements in positioning (satellites), surveying (multibeam) and processing (computers) and the availability in digital form of enormous quantities of new data also, as the Mediterranean area, suggested to begin the collection and preparation of the new available data in a form suitable for any purpose.

The purposes of this work could be:

- exploration and exploitation for any scientific, industrial or economic research or project;
- constitution of a database for coastal management, margin risks.

The availability of the data in digital form will permit the maximum possible flexibility for their use, including the cartographic representation in any projection, format and scale, in 3D, etc..

Dr. Hall reviewed the philosophy behind the preparation of the second Edition of the IBCM, which will be a gridded digital terrain model for the land and sea with nodes every 0.1', on the WGS-84 horizontal datum. This density was chosen not because sufficient data is available every ~ 185m, but rather to give a nearby location to the existing data, and to accurately portray areas surveyed by swath on grids of ~ 100m.

A more detailed discussion is given in the VIIth IBCM Report from the June 1998 Meeting in Croatia. In brief, most efforts will be directed towards building a coastal-basin marginal grid between the deep basins which are being scientifically investigated by swath, and the land which is presently gridded at approx. 1 km and which will be gridded at better than 100 m by spaceborne interferometric radar.

The product of this effort will be a single CD-ROM with the 0.1' grid data for all the Mediterranean and Black Sea areas in the original IBCM, plus files with a redigitized WGS-84 coastline from the best available sources.

4. INTERNATIONAL BATHYMETRIC CHART OF THE CARIBBEAN SEA AND THE GULF OF MEXICO (IBCCA)

See Assembly diagram in Annex II.

4.1 MEETINGS OF THE EDITORIAL BOARD FOR THE IBCCA

The Seventh Session of the IOC Editorial Board for the International Bathymetric Chart of

the Caribbean Sea and the Gulf of Mexico (IBCCA) was hosted by the Instituto Nacional de Estadística, Geografia e Informática (INEGI) in Aguascalientes, Ags., Mexico, 9-11 November 1998.

Attendees were welcomed by Ms. Guadalupe López Chávez, General Director of Geography of INEGI. The meeting was then co-chaired by Mr. J.L. Frías Salazar, Vice-Chairman IBCCA and Mr. F. Takaki, both from INEGI. The following countries were represented: Cuba (GEOCUBA), Colombia (CIOH), Costa Rica (IGN), France (EPSHOM), USA (NGDC), Russian Federation (HO) and Mexico (INEGI). In addition, Dr. D. Travin and Ing. en chef M. Huet represented the IOC Secretariat and the IHB, respectively.

4.2 COMPOSITION OF THE EDITORIAL BOARD

The present membership of the Editorial Board is listed in Annex I.

4.3 PROGRESS IN EDITING AND PRINTING OF IBCCA SHEETS

See diagram in Annex II.

Compilation of each sheet is done in the country having responsibility for that sheet. Then, the sheet is digitized or scanned and vectorized, through the combined efforts of the country concerned and the Chief Editor office, the Directorate of Geography of INEGI in Mexico. When a sheet is completed in digital form, its editing will be undertaken at INEGI prior to printing.

We can see from the diagram (Annex II):

Sheet 1.04 and 1.09 have been printed. Copies are available from INEGI at the price of 10 USD plus postage (Fax: +52 5 5639932, E-mail: Jfrias@mdf.inegi.gob.mx, Attn. Mr. José Luis Frías Salazar) or from: Ocean Mapping (IOC), Cumbers, Mill Lane, Sidlesham, Chichester P020 7LX, United Kingdom (Fax: +44 1243 641222).

Sheets 1.01, 1.02, 1.03, 1.05, 1.06, have been fully digitized and have been incorporated into the digital data base.

Sheets 1.07, 1.08 have been digitized but after reviewing the bathymetric contours, have been sent to Cuba to incorporate new bathymetry.

Sheets 1.11 and 1.15 have been digitized and are being reviewed. Editing of general of them is in progress at INEGI.

Printing of IBCCA Sheets has been delayed due to internal printing problems at INEGI.

Mr. Frías Salazar raised the problem of printing the full-sized map sheets in the old main press at INEGI, but the solution exists to print each map in two parts using the capacity of the small press. Financial support has been requested from IOC, for continuing the printing programme for IBCCA (See Annex III).

The Chief Editor plans to print colour proofs for Sheets 1.01, 1.02, 1.03, 1.05, 1.06, 1.07 and 1.08, by the end of 1999.

Ms. Lisa Taylor presented a "demo" with raster files for sheets 1.01, 1.02, 1.03 and 1.04, using the Netscape software.

Mr. J.L. Frías presented a "demo" of the vector file for the Gulf of Mexico areas 1.01, 1.02, 1.05, and 1.06, compiled for USA and Mexico.

Considering that much information is now in digital form, the board expressed its interest in producing a CD-ROM for IBCCA, including all data currently available in digital form, which will be presented to the next meeting of the IOC Consultative Group on Ocean Mapping (CGOM), to be held in Monaco, in April 1999; to this respect. The meeting agreed to require international financial support to continue with the printed sheets and the production of CD-ROMs for IBCCA.

4.4 IBCCA GEOPHYSICAL-GEOLOGICAL SERIES

The Board agreed that, as a first step, the following three series of geophysical maps at scale 1:1,000,000 should be produced: magnetic anomalies, gravity anomalies and seismicity.

They will be based on the bathymetric series, as was done with the IBCM. Noting that general geophysical maps for IBCCA area had already been published, it was further agreed that the initial work consists of digitizing those maps, with the permission of the authors/publishers and sending them to the members of the Editorial Board according with the area of responsibility.

Cuba suggested that the IHO Transfer Standard S-57 be used for the exchange of IBCCA digital data. The IHB was asked to assess this proposal and to co-ordinate this matter.

4.5 LIST OF AGREEMENTS

- To produce the first version of the CD-ROM for IBCCA assembled with all IBCCA data currently available in digital form until end of March 1999, which will be presented to the next meeting of the IOC (CGOM) Consultative Group on Ocean Mapping to be held in April 1999.

- Price of 10 US$ assigned to sheets 1.04 and 1.09, that have been printed.

- The US NGDC (National Geophysical Data Center) will prepare, jointly with the INEGI (Instituto Nacional de Estadística, Geografía e Informática), Mexico, a Web page for the IBCCA Regional Project, to promote the project via the Internet by April 1999 and if possible to edit a brochure for IBCCA.

- Cuba, Colombia and Costa Rica agreed to fulfil their compilations of their corresponding areas of responsibility and will deliver them to the Chief Editor at INEGI in digital form, in order to incorporate them in the automatic editing program for IBCCA.

- Mexico will continue with the digitization of the sheets they have been receiving from compilers and will prepare a colour proofing of each one of them.

- The Chief Editor will send the proposal of the list of undersea feature names by the Compilers to the Sub-Committee on Undersea Feature Names (SCUFN) for its examination.

Ms. Guadalupe López Chávez, General Director of Geography at INEGI, was elected as Chairman of the Editorial Board and Mr. José Luis Frías was elected as Vice-Chairman.

The 8th Session of IBCCA has been tentatively planned in September 2000 at the IHO Data Centre for Digital Bathymetry (DCDB), US National Geophysical Data Center (NGDC), Boulder, Colorado, USA.

5. INTERNATIONAL BATHYMETRIC CHART OF THE CENTRAL EASTERN ATLANTIC (IBCEA)

See Assembly diagram in Annex II.

5.1 MEETINGS OF THE EDITORIAL BOARD FOR THE IBCEA

The 3rd Session of the Editorial Board is planned to be held in Dakar, Senegal.

5.2 COMPOSITION OF THE EDITORIAL BOARD

The present membership of the Editorial Board is listed in Annex I.

5.3 PROGRESS WITH COMPILATION AND PRODUCTION OF IBCEA

5.3.1 A few items of the record of the last meeting (IOC/CGOM-VI/3, para. 5.3) require updating as follows:

All difficulties in collecting data from French sources such as IFREMER and ORSTOM, have now been overcome. Moreover an informal agreement has been reached between SHOM and ELF, a major French oil company which has had and will be very active in the area, to make sure that no significant data is missed. Unfortunately, it has not been possible to recover data from CERESCOR (Guinea).

It should be made clear that for sheets No. 1.04 and 1.05, only the compilation of the charts has been undertaken by Mr. Hunter, the printing and distribution being accepted by France (SHOM).

It was erroneously stated that Morocco and Ivory Coast were willing to participate in IBCEA. Indeed the Editorial Board indicated such wish, but these countries had not at that time been approached.

5.3.2 The present status of the project is as follows:

5.3.2.1 For the sheets allocated to France (6, and 8 to 12):

- Sheet No. 6 is almost ready to be circulated for reviewing by the Members of the Editorial Board and will be in May 1999.

- Sheet No. 8 is about to be printed. The first proof copy shows that the adopted process of quadrichromy will give quite satisfactory results. The first print should be available within 5 to 6 weeks.

- Sheet No. 9 will be ready shortly, probably in June 1999. At the same time a file of the geographical names will be transmitted to SCUFN for each sheet, for review and decision. Both sheets should be ready for printing before the end of 1999.

- Sheets Nos 10-11-12 are in the process of compilation. According to the present time schedule, they should be ready for printing before the end of 2000. The end of the compilation phase of these three sheets will enable SHOM to undertake compilation of sheets 10 and 16 of the IBCCA project.

5.3.2.2 For the sheets allocated to Portugal (1,2,3 and 7) we have no formal information about their present status. According to last minute information received during the Session, sheet No. 1 should be published within a few months and No. 3 shortly afterwards, some technical difficulties with the cartographic software explaining the delay.

5.3.2.3 Sheets 4 and 5 were formerly allocated to Spain, and kindly taken over by Mr. Peter Hunter. No. 4 has been compiled and No. 5 almost compiled. They will be shortly transmitted to SHOM and inserted into the publication schedule, after reviewing by the Editorial Board.

5.3.2.4 According to a decision taken during the second session of the IBCEA Editorial Board (Paris, October 1996) publication of each sheet will be followed by transmission of the associated digital data to the GDA editor.

6. INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN INDIAN OCEAN (IBCWIO)

See Assembly diagram in Annex II.

6.1 MEETINGS OF THE EDITORIAL BOARD FOR THE IBCWIO

The 4th Session of the Editorial Board was held in Cape Town, South Africa, 6-10 October 1997 (doc. IOC/EB-IBCWIO-IV/3).

6.2 COMPOSITION OF THE EDITORIAL BOARD

The present membership of the Editorial Board is listed in Annex I.

6.3 PROGRESS WITH COMPILATION AND PRODUCTION OF IBCWIO

Sheet No. 1.04 is ready to print. A computer-colour print was shown to the CGOM. It will be printed at the end of April. The question came up as to how to use altimetry data from Satellite. The Group considered that when there is a lack of bathymetric data, altimetry data could be used.

South Africa has announced that they have an experienced scientist at the University of Cape Town who will act as Scientific Reviewer for sheets 1.16-1.21.

Sheet No. 1.07 is in the digitizing stage, and sheet No. 1.16 in the drafting stage. South Africa will soon send the final draft.

7. INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN PACIFIC (IBCWP)

See Assembly diagram in Annex II.

7.1 MEETINGS OF THE EDITORIAL BOARD FOR THE IBCWP

The 2nd Session of the Editorial Board is planned to be held in Beijing, China.

7.2 COMPOSITION OF THE EDITORIAL BOARD

The present membership of the Editorial Board is listed in Annex I.

7.3 IBCWP WORK IN RECENT YEARS

The IBCWP project has gone slowly in recent years because of certain reasons which will be discussed in the third part of this report. There has been little distinct progress in most participating and responsible countries. Only a few countries have made much progress. The detailed information on the IBCWP work in the Member States is as follows:

Russia, as the Responsible Country for the Sub-Region 1, has achieved further progress in the IBCWP Project. It continues the preparation of source data for the IBCWP project. Up to now, 10 original plotting sheets (scale: 1:500,000) have been compiled. Two more plotting sheets, as well as sheets 1-12, 1-13, 1-14 of the chart at scale 1:1,000,000 are under compilation.

There is little distinct progress in Japan, the Responsible Country for the Sub-Region 2. No further information has been received.

China, as the Responsible Country for the Sub-Region 3, has done much work for the IBCWP (see details in the following part of the report).

Little direct progress has been made during the past year, specifically towards the implementation of IBCWP in Australia, the Responsible Country for Sub-Region 4. However, considerable progress has been made by Australia, particularly by the Australian Geological Survey Organization (AGSO), in seabed mapping in the Australian region, including the Western Pacific area adjacent to Australia. But no information is available from Australia on the combination of the IBCWP and these domestic programmes.

SOPAC confirmed that it was willing to join EB-IBCWP and, in principle, to act as the responsible organization for Sub-Region 6.

Malaysia has been taking an active part in the IBCWP. Data are being gathered for sheets 3-12, 3-16 and 3-17. Actual data collecting cruises are also carried out from time to time. Compilation of sheets for 3-16 and 3-17 at the scale of 1:1,000,000 has commenced in accordance to the work plan as agreed at the Second Session of the EB-IBCWP and the specifications for the IBCWP.

Philippines are slowly building up our digital hydrographic database with existing paper charts and recent surveys as primary data sources. It is expected that data collection will be accelerated with the commissioning of their two new hydrographic/oceanographic vessels.

The Republic of Korea will complete the bathymetric survey in the west Coast of Korea in 2002 and the establishment of its database is in progress.

There is no information from New Zealand and Vietnam.

7.4 CHINESE WORK ON THE IBCWP

Since the Second Session of the EB-IBCWP, China has completed the following work on the IBCWP:

7.4.1 Collection and Sorting Out of Current Bathymetric Data of the IBCWP Sub-region 3

In recent years, China has conducted bathymetric surveys in its inshore areas. The sounding work was conducted densely. Data were supplied and updated rapidly. The bathymetric data from these surveys have been used in the nautical charts at a series of scales. In the offshore areas, China has also conducted several marine scientific surveys in which the positioning technique has been improved and the sounding has become more and more accurate. A large amount of valuable bathymetric data has been obtained from the surveys. A data catalogue and dataset are being prepared.

7.4.2 1:500,000 Bathymetric Charts of Chinese Inshore Waters and Adjacent Sea Areas

Since 1996, 43 sheets of the bathymetric charts of the Bohai Sea, Yellow Sea, East China Sea

and South China Sea have been compiled and published on the basis of current national and foreign bathymetric data. They are able to provide the basic contour data for partial sheets of the Sub-Region 3 of the IBCWP. Complying with the IBCWP Specifications, China has compiled five sheets of the Subregion 3 (3-2, 3-6, 3-7, 3-11, 3-12). Besides intervals of 200 m, the contour lines of 500 m, 1500 m, 2500 m, 3500 m, 4500m etc., are expressed by a thin green line in the charts, in accordance with the UNCLOS and at the suggestion of Mr. Desmond P.D. Scott.

7.4.3 Research on Computer-aided Compilation of Bathymetric Chart

After the integration and optimization of computer hardware and software, a computer-aided mapping system has been established, including data input, data processing, chart compilation and output. This system is suitable for the compilation of marine charts. It provides the advanced, standard, precise and quick techniques for the compilation and making of digital, electronic and multi-media bathymetric charts. The practical application shows that the system is functionally perfect, the interface is friendly, and operation and maintenance are easy. The basic configuration of the system is: 2 SUN Workstations and 1 PC acting as server. Six PCs act as image workstations. They comprise the local network. One large-scale scanner and one plotter are the input and output devices. The integrated software consists as Microstation, CorelDraw and Arc/Info.

7.4.4 Implementation of Surveying and Mapping Plan of Inshore and Adjacent Sea Areas (1998-2001)

The development and application of Multibeam Echo Sounders and Side Scan Sonar allow their use for seabed surveys. The contour chart of the surveyed sea area is able to be mapped quickly and automatically because of the improvement of high resolution and multibeam formulation technology, generation of shallow-water working system, enhancement of data, and image processing storage and displaying abilities and the application of GPS. Using the above technologies, China has began to implement the precisely surveying and mapping plan for its Continental Shelf and EEZ. Work has been done at the marine test sites. The duration of the plan is five years. It will provide information on the precise bathymetric data/image for the IBCWP.

7.5 EXISTING PROBLEMS

7.5.1 Concerning the compilation of the united catalogue of bathymetric data for the IBCWP, which was proposed by China, the Member States have not submitted their respective data catalogues, thus resulting in its non-implementation. So, the EB-IBCWP cannot make precise statistics on the quantity and the distribution of the data.

7.5.2 There exists great difficulty in bathymetric data exchange among the Member States. The data to be held by the Member States cannot be shared. It will influence the quality and precision of charts, and evaluation of the EB-IBCWP on the charts will also be influenced by it.

7.5.3 The plans decided at the Second Session of the EB-IBCWP have not been implemented. For example, up to now the Third Session and the technological training programme have not been held yet. We hope that IOC, NOAA and NGDC could provide support for them.

7.5.4 With the entry into force of the UNCLOS, it is important to the interests and rights of all the marine countries in the world. This makes the situation in South-east Asia and the East China Sea both subtle and complex, which possibly makes some impact on the data exchange among the Member States, and even on the whole progress of the IBCWP project.

8. INTERNATIONAL BATHYMETRIC CHART OF THE ARCTIC OCEAN (IBCAO) JOINTLY SPONSORED BY IOC, IASC, IHO

Assembly diagram not yet available. High Seas (patterned) and approximate limits of Zones of National Interest (ZNIs) north of 64N are shown in Annex II.

8.1 FIRST MEETING OF THE EDITORIAL BOARD FOR THE IBCAO

The Inaugural Session of the Joint Editorial Board took place in the premises of the Royal Danish Administration for Navigation and Hydrography in Copenhagen, Denmark, 19-20 October 1998.

Mr. Ron Macnab of the Geological Survey of Canada, and Mr. Arne Nielsen of RDANH acted as Chairmen.

8.2 COMPOSITION OF THE EDITORIAL BOARD

The membership of the Editorial Board is listed in Annex I.

8.3 INTRODUCTION

IBCAO has two primary objectives: (1) to construct a modern digital data base of all available bathymetric observations north of 64N; and (2) to use this data base for the preparation of an accurate regional map. The project was launched in an effort to rectify serious shortcomings in existing regional charts of the Arctic, and to do so by capitalizing upon significant new opportunities that began to materialize in the mid 1990s, i.e. improved access to historic data sets that had been collected over previous decades by agencies of the USA and the former Soviet Union; modern sounding programmes executed for scientific purposes by German and Swedish icebreakers; and unclassified under-ice mapping missions undertaken by submarines of the US Navy.

8.4 DEVELOPMENTS TO DATE

The project had its genesis during an Informal Workshop held in October 1996 at the Polar Marine Geosurvey Expedition (PMGE) in St. Petersburg-Lomonosov, Russia, when specialists from the five coastal states that border upon the Arctic Ocean met to discuss scientific and technical issues relating to the preparation of continental shelf claims beyond 200 nautical miles, according to the provisions of Article 76 of the Law of the Sea. In anticipation of potential contentions arising from overlapping continental shelf claims, Workshop attendees recommended that coastal states around the Arctic Ocean consider joint action to consolidate their data holdings in the region, for the purpose

of developing a common understanding of the bathymetric and geologic conditions that affect the implementation of Article 76.

Under the auspices of the International Arctic Science Committee (IASC), an Arctic Bathymetry Workshop was next convened at the Research Institute for Geology and Mineral Resources of the World Ocean (VNIIOkeangeologia) in St. Petersburg in September 1997, to review the status and availability of bathymetric data holdings, and to nominate members of a working group. Subsequently a formal affiliation with IOC was established, and endorsement for the undertaking was obtained from the IOC/IHO GEBCO Programme.

The first formal meeting of the Editorial Board took place in Copenhagen in October 1998, where tasks and responsibilities were assigned according to a general plan for assembling and consolidating data sets. It was agreed that the represented agencies from each coastal state would assume responsibility for assembling and treating proprietary and public data within their own EEZ's, and that they would work with their neighbours to ensure continuity of data across bilateral boundaries. The High Seas would be treated on a collective basis, using public data only. Issues related to presentation standards and to the distribution of final products were deferred for consideration and discussion in the months leading up to the next formal meeting.

In February 1999, US and Swedish members of the Editorial Board met at Stockholm University to merge data sets from several sources: existing public-domain observations; soundings extracted from published and proof maps prepared by the Head Department of Navigation and Oceanography of the Russian Navy; historic and modern measurements by submarines of the US Navy; and recent measurements collected by Swedish and German icebreakers.

8.5 FUTURE ACTIVITIES

Three complementary posters that describe different aspects of the project will be presented at the General Session on Ocean Sciences of the Spring Meeting of the American Geophysical Union (AGU) in Boston, 31 May to 4 June 1999. The primary purpose of these presentations is to acquaint members of the broader geoscientific community of the objectives of IBCAO, and of its potential research benefits.

A special session to review the status of the project is scheduled to occur during the GEBCO Meetings in Halifax, 23-30 June 1999. The primary focus of this session will be to describe the procedures employed by US and Swedish members of the Editorial Board for merging and reconciling depths extracted from Russian charts with observations collected by submarines of the US Navy, and to present the preliminary results of this work.

The second formal meeting of EB-IBCAO is scheduled to take place in Monaco in November 1999, when participants will: (a) report on the results of bilateral and multilateral collaborations since October 1998; (b) identify data issues that remain to be resolved; and (c) begin consideration of techniques for presenting and distributing the assembled data sets.

Barring unforeseen problems, completion of the project is anticipated by late in the Year 2000, at which point maps and grids will be released into the public domain, and a procedural framework will be in place to facilitate future upgrades.

8.6 COMPLEMENTARY MAPS

A number of maps that display geological and geophysical parameters for the same region have been produced, or are in planning stages. In the late 1980s and early 1990s, a collaboration with Russian investigators yielded separate maps of Quaternary and Bedrock Geology. In the mid 1990s, researchers of the Geological Survey of Canada working under the auspices of the International Association for Aeronomy and Geomagnetism (IAGA) assembled and rationalized a large quantity of magnetic data sets obtained from numerous international partners; in 1998, a cooperation with the Cambridge Arctic Shelf Programme (CASP) led to the construction of a combined Tectonic and Magnetic Map of the Arctic. Also in 1998, a new international initiative was launched under the auspices of IASC and the International Association for Geodesy (IAG) to construct a gravity map of the Arctic. In the meantime, exploratory discussions have been initiated with Russian investigators to assess prospects for international collaboration in the preparation of a circumpolar map of sediment thickness.

9. INTERNATIONAL GEOLOGICAL-GEOPHYSICAL ATLASES OF THE ATLANTIC AND PACIFIC OCEANS (GAPA)

9.1 MEETINGS OF THE CENTRAL EDITORIAL BOARD FOR GAPA

None.

9.2 COMPOSITION OF THE CENTRAL EDITORIAL BOARD

The membership of the Central Editorial Board is listed in Annex I.

9.3 FINALIZATION OF WORK

Mr. Desmond Scott, Deputy Editor GAPA, reported that compilation of the International Geological-Geophysical Atlas of the Pacific Ocean, which is the final atlas of the GAPA project, is about 70% complete but owing to financial difficulties work has now virtually ceased at the present time. This is most unfortunate in view of the large amount of work that has already been carried out and, in addition, the longer the delay the more out of date the maps become.

Every effort is being made to find a new source of funds so that the atlas can be completed and published. If this is unsuccessful, action will be taken to publish certain new maps separately, for example, and in particular, the Thickness of Sediments section of the atlas.

C. OTHER MATTERS

10. DECISIONS TAKEN BY THE IOC ASSEMBLY AT ITS 19TH SESSION, ON OCEAN MAPPING, PARIS, JULY 1997

The IOC Assembly adopted Resolution XIX-3 on Ocean Mapping. The text of this resolution as well as related paragraphs 114 to 122 of the Summary Report are presented in Annex IV.

11. TEMA IN OCEAN MAPPING

The Chairman CGOM attended the 19th Session of the IOC Executive Council in Paris, on 19 November 1998, and delivered a statement on training in Ocean Mapping to enable developing States to take part in the establishment of large scale maps in order to allow them to explore the wealth of their EEZs.

The statement is attached as Annex V.

12. PROPOSALS FOR LARGE SCALE MAPS OF COASTAL AND SHELF AREAS, TO ALLOW DEVELOPING COUNTRIES TO EXPLORE THE WEALTH OF THEIR EEZS.

The Chairman CGOM had been invited by the Executive Secretary IOC to represent IOC at the 13th Meeting of the Standing Committee of the Indian Ocean Marine Affairs Cooperation (IOMAC), in Colombo, Sri Lanka, 27-30 May 1998. He was made Chairman of its Technical Cooperation Group (TCG). The meeting expressed at several occasions an urgent need for large scale mapping of coastal and shelf areas for the exploration and exploitation of the resources of the EEZs, for archaeological investigations, and the determination of the outer limit of the EEZs and Continental Shelf.

Dr. Ragoonaden, Chairman of IOCINCWIO at its 4th Session, by letter of 2 September 1998, raised the same matter and stressed "the urgent need to initiate the preparation of large scale bathymetric charts of nearshore areas to enable countries in the IOCINCWIO region to start the exploration of the wealth of their EEZs".

13. WEB SITES

The Group recommended that, as already developed by IBCCA and IBCWIO, the remainder of the regional IBCs set up separate Web Sites, with hyperlinks to the GEBCO Web Site, in close consultation with Ms. Carla Moore at the National Geophysical Data Center (NGDC), Boulder, Colorado, in order to ensure standardization of presentation.

14. INTERNATIONAL "WORLD OCEAN" ATLAS

The Hydrographic Service and scientific organizations of Russia continue, in accordance with an FAO proposal, with work on creation of the International "World Ocean" Atlas as a component of the UN Atlas of the Oceans.

By now the new bathymetric chart of the Arctic Ocean at scale 1:5,000,000 has been compiled and it will be incorporated in the first volume of the "World Ocean" Atlas.

Ocean bottom features on the chart have been specified; the chart is colourfully designed and reads well.

Bathymetric chart scheming of the rest of the World Ocean areas has been developed as well as scales and projects of thematic charts for other Atlas volumes have been selected.

15. ACKNOWLEDGEMENTS

The Consultative Group on Ocean Mapping wishes to express its gratitude and great appreciation for the close co-operation and support that is provided by the co-sponsors of the Ocean Mapping Programme, namely the International Hydrographic Organization (IHO) and, more recently, the International Arctic Sciences Board (IASC).

16. APPROVAL OF THIS REPORT BY THE CGOM

The Report was approved by the Consultative Group on Ocean Mapping at its 7th Session, in Monaco, 12-14 April 1999. The IOC Executive Secretary is invited to transmit this report to the IOC Assembly, at its 20th Session in Paris, 29 June-9 July 1999, pursuant to the CGOM Terms of Reference, Clause 1.

ANNEX I

MEMBERSHIP OF ALL GROUPS RESPONSIBLE FOR SUPERVISING OCEAN MAPPING PROJECTS SPONSORED (OR CO-SPONSORED) BY THE COMMISSION

A. JOINT IOC-IHO GUIDING COMMITTEE FOR THE GENERAL BATHYMETRIC CHART OF THE OCEANS (GEBCO)

Sir Anthony Laughton (UK)	**Chairman** representing SCOR
Mr. David Monahan (Canada)	**Vice-Chairman** IHO appointment
Ing. gén. Patrick Souquière	Directeur adjoint du Service Hydrographique et Océanographique de la Marine, France
Dr. Michael S. Loughridge	Director, National Geophysical Data Center, Boulder Co. USA
Dr. Robin K.H. Falconer (New Zealand)	representing CMG
Lic. José Luis Frías Salazar (Mexico)	IOC appointment
Dr. Ing. Hans-Werner Schenke (Germany)	IOC appointment
Mr. Alexis E. Hadjiantoniou (Greece)	IOC appointment
Dr. Gleb B. Udintsev (Russian Federation)	IOC appointment
Dr. Kunio Yashima (Japan)	IHO appointment

SCIENTIFIC ADVISERS TO THE GEBCO

Mr. Norman Z. Cherkis	U.S. Naval Research Laboratory, Washington DC, USA
Dr. Meirion T. Jones	Director, British Oceanographic Data Centre, Southampton, UK
Dr. Larry A. Mayer	University of New Brunswick, Canada
Dr. Gary Robinson	Environmental Systems Science Centre, University of Reading, United Kingdom
Dr. Walter H.F. Smith	Geosciences Laboratory, NOAA/NOS, USA
Dr. Andrew Goodwillie	Scripps Institution of Oceanography, USA
Cdr. Carlos Miguel Passoi Hansen	Director de Hidrografia e Navagação, Brazil
Mr. Ron Macnab	Geological Survey of Canada, Darmouth Nova Scotia, Canada

Also (ex-officio):

Mr. Brian Harper	Permanent Secretary GEBCO
Mr. Peter Hunter	GEBCO Bathymetric Editor
Ms. Pauline Weatherall	GEBCO Digital Atlas Manager
Rear Admiral Giuseppe Angrisano	President of the Directing Committee, IHB
Mr. Dmitri Travin	IOC Secretariat, UNESCO, Paris

GEBCO SUB-COMMITTEE ON DIGITAL BATHYMETRY (SCDB)

Dr. Meirion T.Jones	**Chairman** **Director, British Oceanographic Data Centre**
Mr. Norman Z. Cherkis	U.S. Naval Research Laboratory
Dr. Michael S. Loughridge	Director, National Geophysical Data Center, USA
Mr. William Rankin	U.S. Naval Oceanographic Office
Capt. Andrey Popov	Head of Department of Navigation & Oceanography, Russian Federation
Dr. Ing. Hans-Werner Schenke	Alfred-Wegener-Institut, Germany
Mr. Shin Tani	Japan Oceanographic Data Center, Tokyo
Mr. Alexis Hadjiantoniou	Hellenic Navy Hydrographic Service, Athens
Rear Admiral Neil R. Guy (ex officio)	Director IHB, Monaco, Chairman IHO Committee on Hydrographic Requirements on Information Systems (CHRIS)

GEBCO SUB-COMMITTEE ON UNDERSEA FEATURE NAMES (SCUFN)

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Ing. en Chef Michel Huet	International Hydrographic Bureau, Monaco
Dr. Galina V.Agapova	Geological Institute of the Russian Academy of Sciences, Moscow
Mr. Marco Antonio Carvalho Oliveira	Diretoria de Hidrografia e Navegação, RJ, Brazil
Dr. Robin K.H. Falconer	Institute of Geological and Nuclear Sciences Ltd., New Zealand
Dr. Kunio Yashima	Hydrographic Laboratory, Maritime Safety Agency, Hiroshima, Japan
Mr. Desmond P.D. Scott	UK
Mr. Trent Palmer (advisor)	US Board on Geographic Names, NIMA Hydrographic/Topographic Center, Washington DC, USA
Rear Admiral Neil R. Guy (ex officio)	Director IHB, Monaco

B. CENTRAL EDITORIAL BOARD FOR THE INTERNATIONAL GEOLOGICAL-GEOPHYSICAL ATLASES OF THE ATLANTIC AND PACIFIC OCEANS (GAPA)

Dr. Gleb B. Udintsev	**Chief Editor** **Vernadsky Institute of Geochemistry, Russian Federation**
Mr. Desmond P.D. Scott	**Deputy Editor**
Academician Igor' S. Gramberg	Director, Institute of Ocean Geology, Russian Federation
Dr. Brian T.R. Lewis	University of Washington, USA
Dr. Kiyoshi Suyehiro	University of Tokyo, Japan
Dr. Manik Talwani	Houston Advanced Research Center, USA
Dr. Seiya Uyeda	Tokai University, Japan
Dr. Dina Zhiv	Mapping Production Association "Kartografia", Russian Federation

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Dr. John K. Hall	**Vice-Chairman** **Geological Survey of Israel, Jerusalem, Israel**
Captain Andrey Popov	Head Department of Navigation & Oceanography, St Petersburg, Russian Federation
Prof. Maurice Gennesseaux	Université Pierre et Marie Curie, France
Prof. Emelyan Emelyanov	Atlantic Branch of the Institute of Oceanology, Kaliningrad, Russian Federation
Rear Admiral Neil R. Guy (ex-officio)	Director IHB, Monaco

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Geog. Eduardo Bedoya Benitez	Director General, Instituto Geográfico Nacional, Costa Rica
Major Rolando Feitö Sarduy	Instituto Cubano de Hidrografía, Cuba
Dr. Troy L. Holcombe	National Geophysical Data Center, Boulder, Colorado, USA

Ing. Olivier Parvillers	Service Hydrographique et Océanographique de la Marine, France
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Capitan de Navio Gregorio Pérez Moreno	Director de Hidrografia y Navegación, Venezuela
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Dr. Isabelle Niang-Diop	**Vice-Chairman** **Université C.A.DIOP, Dakar-Fann, Sénégal**
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Mr. Lawrence E. Awosika	Institute for Oceanography and Marine Research Lagos, Nigeria
Dr. Troy Holcombe	National Geophysical Data Center, Boulder Colorado, USA
Dr. E. John W. Jones	University College, London, United Kingdom
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F. EDITORIAL BOARD FOR THE INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN INDIAN OCEAN (IBCWIO)

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Mr. Peter Hunter	Southampton Oceanography Centre, UK
Ing. Olivier Parvillers	Service Hydrographique et Océanographique de la Marine, France
Mr. John Dominic Obel	Survey of Kenya
Mr. Sidney G. Osborne	Hydrographic Office of South Africa
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Mr. Peter Hill	Australian Geological Survey Organisation, Canberra
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Dr. George F. Sharman	National Geophysical Data Center, Boulder, Colorado, USA
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Prof. Kunio Yashima	Hydrographic Laboratory, Maritime Safety Agency, Hiroshima, Japan
Rear Admiral Neil R. Guy (ex officio)	Director IHB, Monaco

H. IOC CONSULTATIVE GROUP ON OCEAN MAPPING (CGOM)

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Prof. Carlo Morelli	**Vice-Chairman**	Also Chairman IBCM
Mr. Desmond P.D. Scott	Former Chairman	
Dr. Werner Bettac	Chairman IBCWIO	
Lic. Mª Guadalupe López Chávez	Chairman IBCCA	
Sir Anthony Laughton	Chairman GEBCO	
Ing. Gén. André Roubertou	Chairman IBCEA	
Dr. Hou Wenfeng	Chief Editor IBCWP	
Mr. Ron Macnab	Chairman IBCAO	
Dr. Gleb B. Udintsev	Chief Editor GAPA	
Rear Admiral Neil Guy	representing IHB	

Representative of the IOC Secretariat for Ocean Mapping

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I. EDITORIAL BOARD FOR THE INTERNATIONAL BATHYMETRIC CHART OF THE ARCTIC OCEAN (IBCAO)

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Mr. Garrik Grikurov	VNIIOkeangeologia, St. Petersburg, Russian Federation
Mr. Hilmar Helgason	Icelandic Hydrographic Service, Reykjavik, Iceland
Mr. Martin Jakobsson	Stockholm University, Department of Geology and Geochemistry, Stockholm, Sweden
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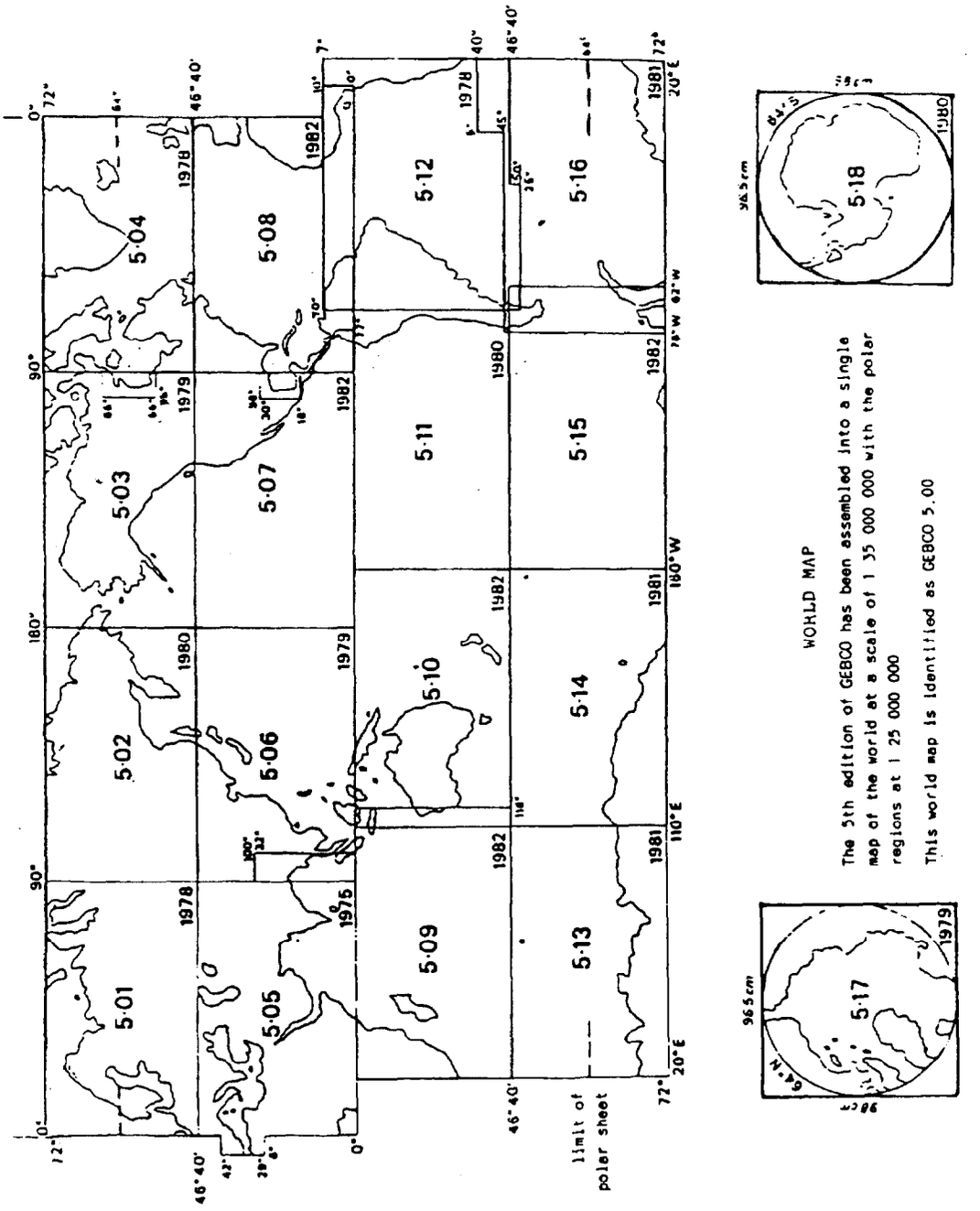
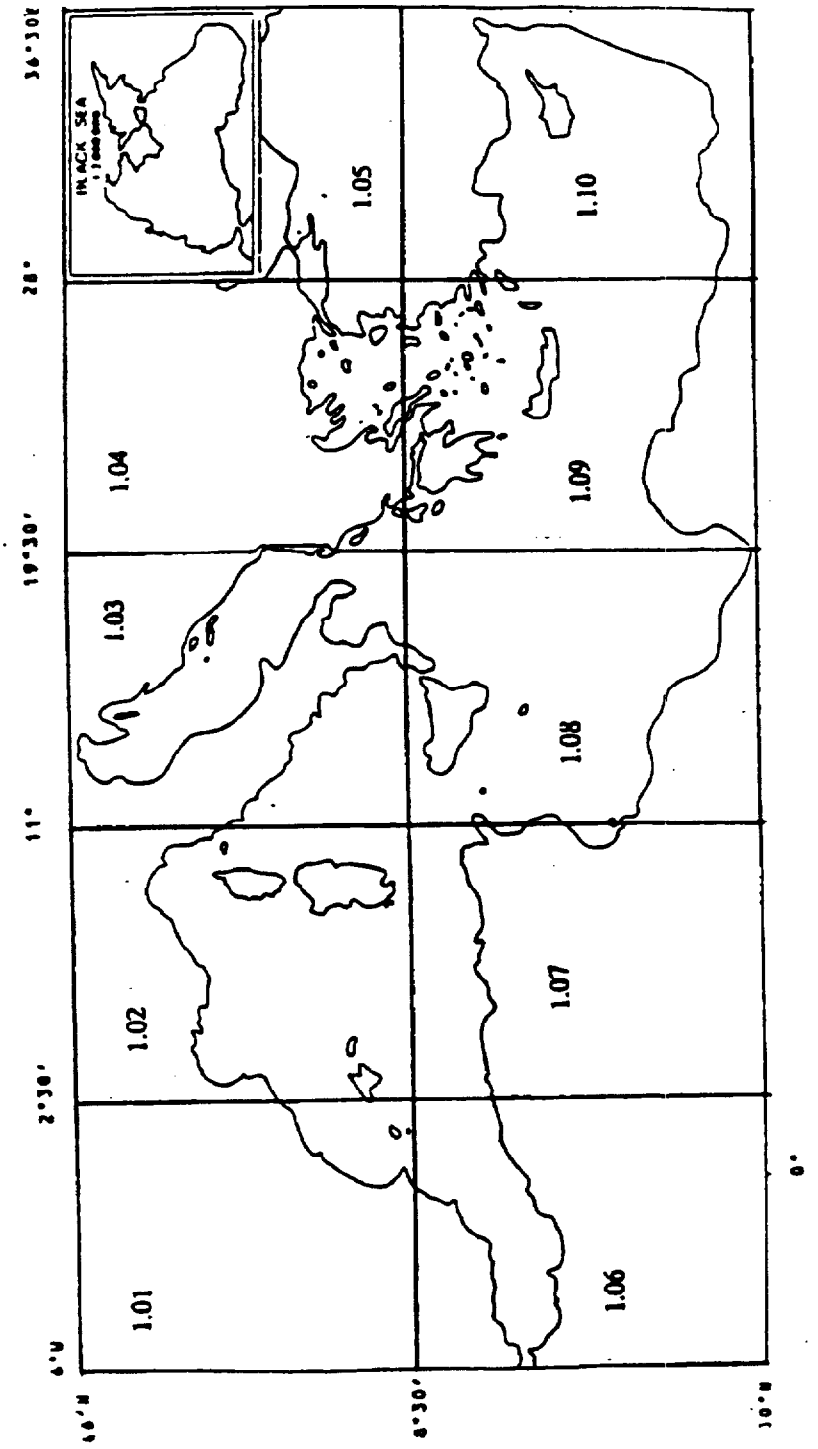
ANNEX II

ASSEMBLY DIAGRAM OF THE GENERAL BATHYMETRIC CHART OF THE OCEANS (GEBCO)
Scale 1/1 million at the Equator

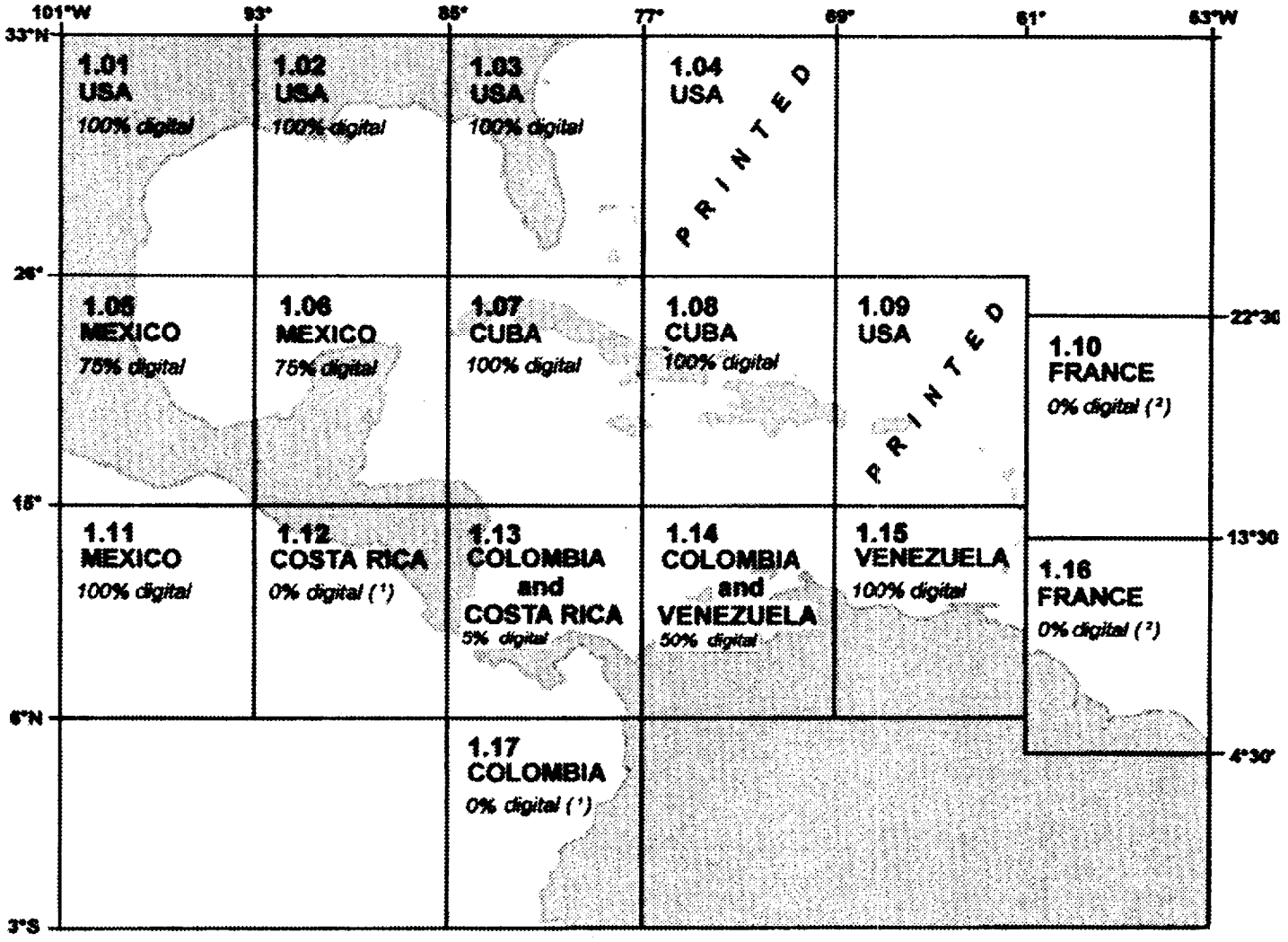


ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE MEDITERRANEAN (IBCM)

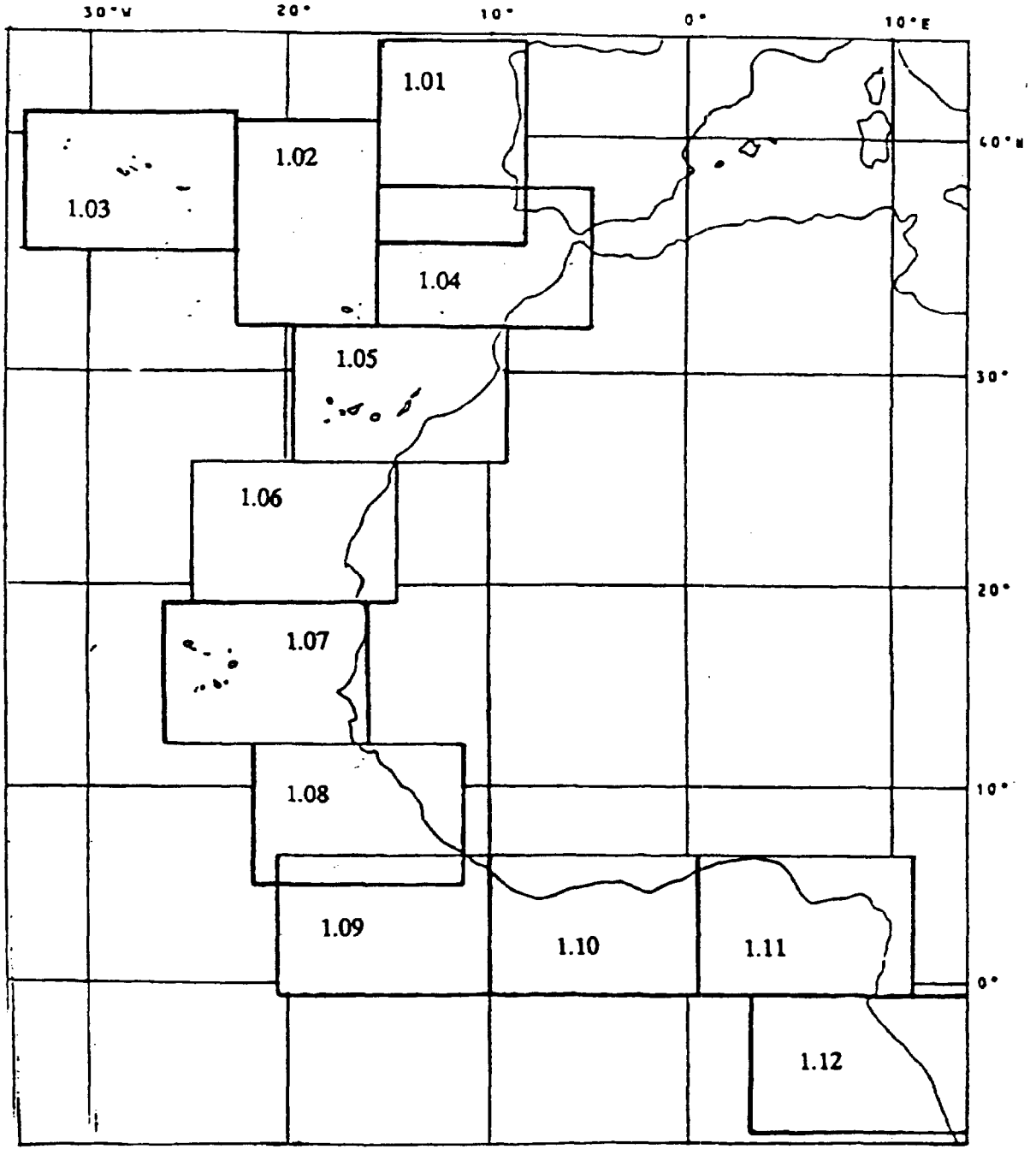
Scale 1:1 million at 38°N



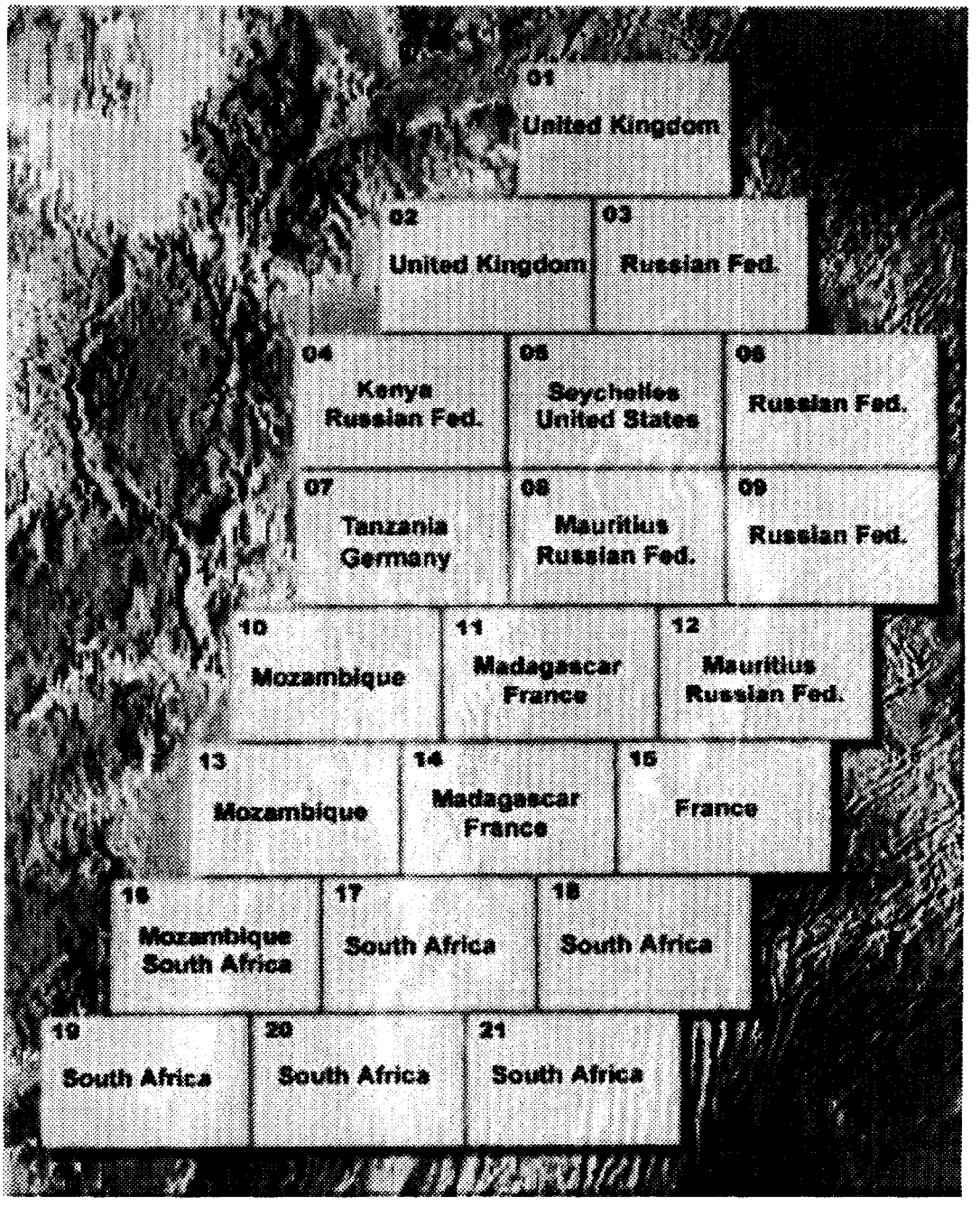
ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE CARIBBEAN SEA AND GULF OF MEXICO (IBCCA)
Scale 1:1 million at 15°N



ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE CENTRAL EASTERN ATLANTIC (IBCEA)
Scale 1:1 million at 20°N

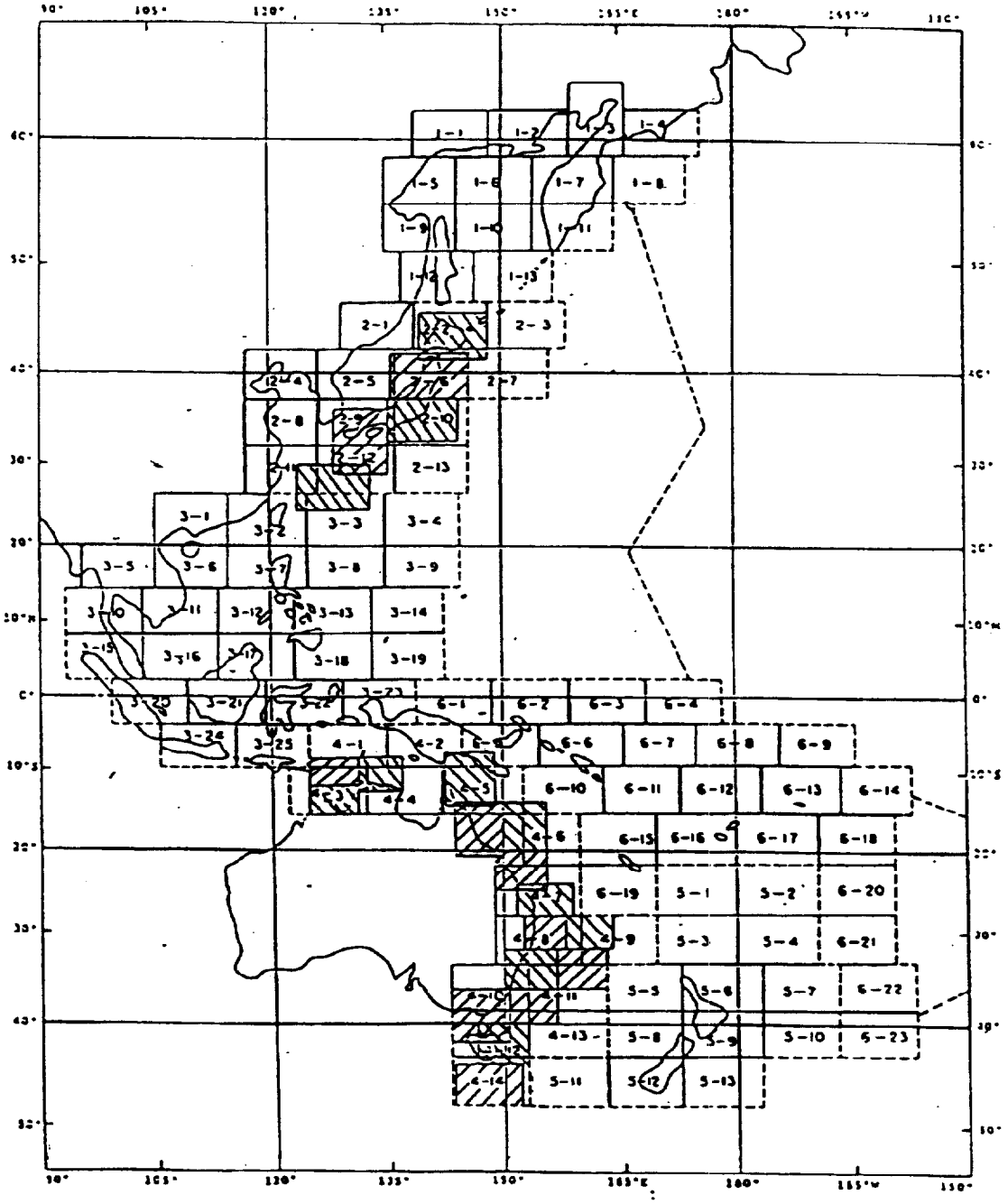


ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN INDIAN OCEAN (IBCWIO)
Scale 1:1 million at the Equator

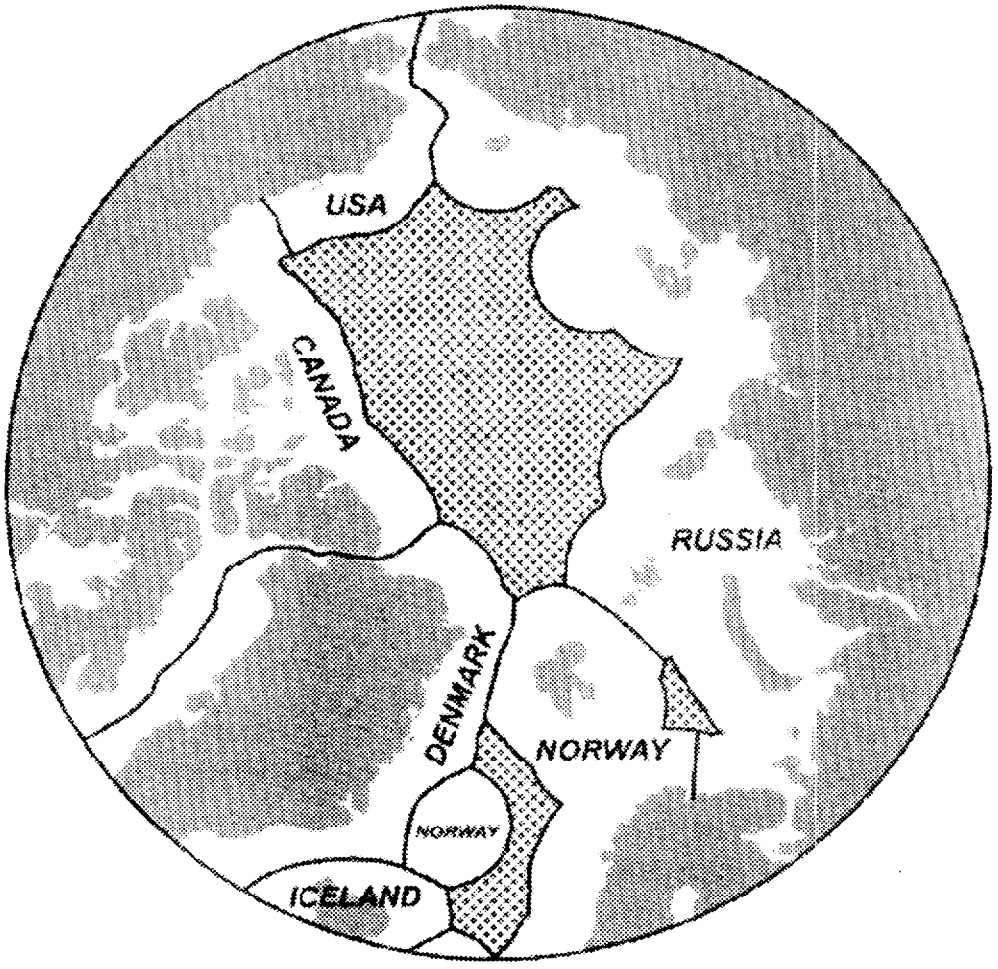


ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN PACIFIC (IBCWP)

Scale 1:1 million at 33° latitude



INTERNATIONAL BATHYMETRIC CHART OF THE ARCTIC OCEAN (IBCAO)
High Seas (patterned) and approximate limits of Zones of National Interest (ZNIs) north of 64N



ANNEX III

LIST OF IOC OCEAN MAPPING PRODUCTS

1. THE GENERAL BATHYMETRIC CHART OF THE OCEANS (GEBCO)

[Jointly sponsored with the International Hydrographic Organization]
(see Assembly Diagram in Annex II, page 1)

Flat sheets:

- 16 sheets 72°N to 72°S, Mercator projection
  Scale 1:10M at the equator;
- 2 polar sheets to 65° lat. Polar Stereographic projection
  Scale 1:6M at 75° latitude;
- 1 world sheet, 72°N to 72°S, Mercator projection
  Scale 1:35M at the equator and 2 polar insets (as above) Scale 1:25M at 75° latitude.
- Supporting Volume.

Boxed Set containing all above 19 sheets (folded)
Supporting Volume and legend.

GEBCO Digital Atlas (GDA) on CD-ROM (GEBCO-97)
GEBCO-97 (February 1997) is the Second Release of the GEBCO Digital Atlas (GDA). It is an updated version of the First Release (March 1994). The following new (updated) data sets are included in the GEBCO-97 CD-ROM:

- bathymetry of the southern Indian Ocean, the north-east Atlantic off the British Isles, and the Weddell Sea
- five versions of the SCAR Coastline of Antarctica at a range of scales from 1:30 million up to 1:250,000 (a new data set replacing the World Vector Shoreline south of 60°S)
- a trackline inventory of the digital echo-sounding data held at the IHO Data Centre for Digital Bathymetry (updated to January 1997)
- a digital set of geographically referenced feature names including the IHO-IOC Gazetteer of Geographical Names of Undersea Features, a list of the ports/cities and Antarctic islands portrayed on the printed sheets of the GEBCO (5th edition), a list of Antarctic stations and a specially prepared list of oceanic islands (IHO/IOC Gazetteer updated with recently approved names)
- a set of supporting documents describing each of the data sets included on the CD-ROM (updated to cover new data sets)

- GDA Software Interface Version 2 (with modifications to correct bugs and some new features)

Guidelines for the GEBCO - IHO/IOC publication B-7
The present state of production is as follows:

Part 1	GEBCO Organizational Framework
Part 2A	Bathymetric Data Management - Analogue Data
Part 2B	Bathymetric Data Management - Digital Data
Part 3	Digital Bathymetric Data (Single-Beam Echo Sounders)
Part 4	Digital Bathymetric Data (MultiBeam Echo Sounders) (Publication expected 1997)
Part 5	Underway Geophysics Data

Catalogue of Bathymetric Plotting Sheets and its Annex - IHO/IOC publications B-2 and B-3

B-2	4th Edition published March 1991;
B-3	6th Edition published May 1991.
Note:	2 contains indexes showing the 1:250,000 plotting sheet coverage of IOC's regional ocean mapping projects.

Standardization of Undersea Feature Names * - IHO/IOC publication B-6

Versions:	English/French	[2nd Edition published 1989]
	English/Russian)	[2nd Edition published 1990]
	English/Spanish)	[2nd Edition published 1993]
	English/Japanese	[1st Edition published 1991]
	English/Chinese	[1st Edition published 1992]

* These publications are provided free of charge on request.

Gazetteer of Geographical Names of Undersea Features shown (or which might be added) on the GEBCO and on the IHO small-scale international chart series (1:2,250,000 and smaller)
[IHO/IOC publication B-8, 2nd Edition, July 1996]
This item is now being maintained and regularly updated in digital form.

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2. THE INTERNATIONAL GEOLOGICAL-GEOPHYSICAL ATLASES

The Geological-Geophysical Atlas of the Indian Ocean (published 1975)

The International Geological-Geophysical Atlas of the Atlantic Ocean (published 1991)

The International Geological-Geophysical Atlas of the Pacific Ocean (in preparation).

3. THE INTERNATIONAL BATHYMETRIC CHART OF THE MEDITERRANEAN AND ITS GEOLOGICAL/GEOPHYSICAL SERIES (IBCM)

(see Assembly Diagram in Annex II, page 2)

Flat sheets:

Bathymetric Chart in 10 sheets Mercator projection
Scale 1:1M (at 38°N.) Black Sea 1:2M.
Bathymetric Chart in 1 sheet Mercator projection
Scale 1:5M (at 38°N.) Black Sea 1:10M.

Digitized contours

These are contained in the GEBCO Digital Atlas (see above).

Geological/Geophysical series
(same scales and sheet limits as the bathymetric chart):

Bouguer Gravity Anomalies (IBCM-G)

Seismicity (IBCM-S)

Thickness of Plio-Quaternary Sediments (IBCM-PQ)

Unconsolidated Bottom Surface Sediments (IBCM-Sed)

Magnetic Anomalies (IBCM-M) (in press)

List of Geographical Names of Undersea Features shown (or which might be added) on the International Bathymetric Chart of the Mediterranean (IBCM) and on the IHO small-scale international chart series for the Mediterranean [IHO/IOC publication B-8 Supplement No. 1 (IBCM), 1st Edition, 1990]

==========

4. THE INTERNATIONAL BATHYMETRIC CHART OF THE CARIBBEAN SEA AND GULF OF MEXICO (IBCCA)

(see Assembly Diagram in Annex II, page 3)

Flat sheets:

Bathymetric Chart Mercator projection Scale 1:1M (at 15°N.)

Sheet 1.04 Published 1994 (USA);
Sheet 1.09 Published 1993 (USA).

ANNEX IV

IOC RESOLUTION XIX-3 ON OCEAN MAPPING & RELATED PARAGRAPHS (114 TO 122) OF THE SUMMARY REPORT OF THE NINETEENTH SESSION OF THE IOC ASSEMBLY

I. IOC RESOLUTION XIX-3

The Intergovernmental Oceanographic Commission,

A.

Recalling that, the IOC Assembly at is Seventeenth Session (March 1993), "stressed that the Ocean Mapping Programme was a priority action of the IOC and should be provided with necessary support." (Document SC/MD/101, paragraph 120),

Recalling further the IOC Resolution XVIII-10 "Support to the Joint IOC-IHO Ocean Mapping Programme" which *inter alia*: (i) instructed the IOC Executive Secretary to initiate discussions on how to establish scientific priorities for bathymetric surveys of the world ocean, etc., and (ii) invited the Director-General of UNESCO to establish one professional post for the Ocean Mapping Programme as of 1996,

Thanks the Scientific Committee on Oceanic Research (SCOR) for establishing Working Group 107 "Improved Global Bathymetry", as a first step towards the preparation of "a well co-ordinated and comsprehensive plan for the coming decade";

Invites the International Hydrographic Organization (IHO) to collaborate closely in the preparation of this plan so as to ensure adequate links with all governmental, as well as non-governmental institutions concerned, and to improve intergovernmental leadership and dialogue;

Accepts the Comprehensive Report of the Consultative Group on Ocean Mapping (CGOM) to the Nineteenth Session of the IOC Assembly (Document IOC/INF-1063);

Thanks the Russian Federation for providing a professional staff member to support the Ocean Mapping programme over a long period;

Instructs the Executive Secretary IOC to continue consultation with the Director-General of UNESCO regarding the establishment of a permanent professional post for Ocean Mapping in the interest of continuity in the present position of the Technical Secretary for Ocean Mapping in the IOC Secretariat;

B.

Taking into account the satisfactory development of five regional International Bathymetric Charts (IBC), and in particular, the recommendations of EB-IBCEA-II (Document IOC/INF-1063, Annex IV), and Resolution IOCINCWIO-IV.1,

Urges Member States to continue giving strong support to the IBC series;

Accepts in principle the statement of the International Arctic Science Committee and the Arctic Ocean Sciences Board that a new internationally-based, bathymetric chart of the Arctic Ocean be produced as a high priority, and

Instructs the Executive Secretary IOC to investigate further the possibility of producing such a chart either as a new regional IBC series, or under General Bathymetric Chart of the Oceans (GEBCO);

Recommends that Member States equip their research vessels with geophysical sensors in addition to hydrographic instruments, permitting simultaneous recording of bathymetry, as well as geophysical parameters;

Urges Member States to make available the results of analyses of bathymetric data for contouring and digitizing, also providing other related geophysical data:

Financial implications for the 1998-1999 period:

• Participation of Ocean Mapping officers, staff and experts in the relevant activities of Ocean Mapping and other programmes, and organizations in 1998-1999	.....US$20,000
• The biennial cycle of the meeting of the Consultative Group on Ocean Mapping in 1999	.....US$15,000
• The meetings of the Editorial Board for the biennial cycle: IBCM IBCWIO, IBCCA, IBCEA and IBCWP in 1998-1999	.....US$105,000
• Contracts for the organization of related Ocean Mapping activities	..... US$70,000
Total required	.....US$210,000

II. RELATED PARAGRAPHS 114 TO 122 OF THE SUMMARY REPORT OF THE NINETEEN SESSION OF THE ASSEMBLY

114 "**The Assembly approved** document IOC/INF-1063.

115 **The Assembly stressed** its strong satisfaction that the Global Ocean Mapping Programme is developing very well and **emphasized** that it represents the basis for many IOC projects and should therefore be strongly supported.

116 **The Assembly welcomed** the use of new technology and equipement in Marine Cartography and **noted with satisfaction** the new issue of the GEBCO Digital Atlas on CD-ROM produced by the British Oceanographic Data Centre in 1997.

117 **The Assembly endorsed** the need to pursue preparation of the regional bathymetric chart series and **also noted** the considerable progress made, particularly with regard to the International Bathymetric Chart of the Western Indian ocean (IBCWIO), the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA), and the International Bathymetric Chart of the Western Pacific (IBCWP).

118 In order to increase the level of co-ordination, certain delegates asked the IOC Executive Secretary to find necessary funds to organize IOC Editorial Board meetings every two years.

119 **The Assembly recognized** that the Ocean Mapping Programme is one of the most successful projects of IOC and should be provided with the necessary support.

120 **The Assembly thanked** the Governments of China, France, Germany, Russian Federation, United Kingdom, USA and other countries for their continuing efforts to support Ocean Mapping activities.

121 **The Assembly**, in view of the increasing importance of refined bathymetry information, **instructed** the IOC Executive Secretary to broaden co-operation with IHO in the areas of bathymetry and hydrography so as to ensure adequate relationship to all governmental institutions concerned and proper intergovernmental leadership and dialogue.

122 **The Assembly adopted** Resolution XIX.3."

ANNEX V

STATEMENT BY DR. GÜNTER GIERMANN, CHAIRMAN OF THE IOC CONSULTATIVE GROUP ON OCEAN MAPPING (CGOM) TO EC-XXXI (1998)

Mr. Chairman,

I wish to draw your attention to some recent initiatives in the Indian Ocean region referring to Ocean Mapping in coastal and shelf areas in order to allow countries to explore and exploit the non-living resources of their EEZ. These mapping surveys will not be productive unless training in bathymetry and in the recording of geological and geophysical parameters is offered to the developing countries of the Indian Ocean region, as a matter of urgency.

The above-mentioned initiatives were taken in Colombo, in May, at the 13th meeting of the Standing Committee of the Indian Ocean Marine Affairs Cooperation (IOMAC) with which IOC has concluded a Memorandum of Understanding - and by the Chairman and Past Chairman of IOCINCWIO who expressed the urgent need to prepare large-scale maps to enable countries "to start the exploration of the wealth of their EEZ".

Training can include courses similar to the ones offered in the past by the German government on board R/V *METEOR* in the IOCINCWIO region, or the expedition of experts to individual countries in order to train people at their local institutions, similar to the training provided a few years ago by Chief Editor of IBCWIO in several IOCINCWIO countries during one single mission.

Mr. Chairman, I shall certainly raise nearshore mapping in all detail at the next session of my Consultative Group on Ocean Mapping in early next year, and then again at the next IOC Assembly which will have both, Ocean Mapping and TEMA, on its agenda. But I am certain that you understand that I had to intervene now to allow related training to start without any delay.

Thank you.