



IOC Consultative Group on Ocean Mapping

Fifth Session

Bremerhaven, Germany

24-25 April 1995

In this Series, entitled

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1964 and which is published in English only, unless otherwise specified, the reports of the following meetings have already been issued:

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
3. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (*Also printed in Spanish*)
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping (*Also printed in French and Spanish*)
12. Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
13. Second session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
18. second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carte Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica (*Spanish only*)
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. second Session of the IODE Group of Experts on Marine Information Management
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources (*Also printed in French and Spanish*)
25. Third Session of the IOC Group of Experts on Effects of Pollutants
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (*Also printed in French*)
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
30. First Session of the IOC-IBRIB Group of Experts on Recruitment in Tropical Coastal Demersal Communities (*Also printed in Spanish*)
31. second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources
33. second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
36. First Consultative Meeting on RNODCs and Climate Data Services
37. Second Joint IOC-WMO Meeting of Experts on IGOSS-IODE Data Flow
38. Fourth Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
39. Fourth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
40. Fourteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
41. Third Session of the IOC Consultative Group on Ocean Mapping
42. Sixth Session of the Joint IOC-WMO-CCPS Working Group on the Investigations of 'El Niño' (*Also printed in Spanish*)
43. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
44. Third Session of the IOC-UN(OALOS) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
45. Ninth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
46. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
47. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
50. Third Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity programmes
51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System
52. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean
53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic (*Also printed in French*)
54. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (*Also printed in Spanish*)
55. Fifth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
56. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
57. First Meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area
58. Fourth Session of the IOC Consultative Group on Ocean Mapping
59. Second Session of the IOC-WMO/IGOSS Group of Experts on Operations and Technical Applications
60. Second Session of the IOC Group of Experts on the Global Sea-Level Observing System
61. UNEP-IOC-WMO Meeting of Experts on Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change
62. Third session of the IOC-FAO Group of Experts on the Programme of Ocean Science in Relation to Living Resources
63. second Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
64. Joint Meeting of the Group of Experts on Pollutants and the Group of Experts on Methods, Standards and Intercalibration
65. First Meeting of the Working Group on Oceanographic Co-operation in the ROPME Sea Area
66. Fifth Session of the Editorial Board for the International Bathymetric and its Geological/Geophysical Series
67. Thirteenth Session of the IOC-IHO Joint Guiding Committee for the General Bathymetric Chart of the Oceans (*Also printed in French*)
68. International Meeting of Scientific and Technical Experts on Climate Change and Oceans
69. UNEP-IOC-WMO-IUCN Meeting of Experts on a Long-Term Global Monitoring System
70. Fourth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
71. ROPME-IOC Meeting of the Steering Committee on Oceanographic Co-operation in the ROPME Sea Area
72. Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (*Spanish only*)
73. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (*Also printed in Spanish*)
74. UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs
75. Third Session of the IODE Group of Experts on Marine Information Management
76. Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
77. ROPME-IOC Meeting of the Steering Committee for the Integrated Project Plan for the Coastal and Marine Environment of the ROPME Sea Area
78. Third Session of the IOC Group of Experts on the Global Sea-level Observing System
79. Third Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
80. Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
81. Fifth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity programmes

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Fifth Session

Bremerhaven, Germany

24-25 April 1995

IOC/CGOM-V/3
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IV	ASSEMBLY DIAGRAM OF THE GENERAL BATHYMETRIC CHART OF THE OCEANS
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VI	COVERAGE DIAGRAM OF MAPS& MAPPING PROJECTS THAT WOULD BE SUITABLE FOR UPDATING THE GDA
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1. OPENING OF THE SESSION

The Fifth Session of the IOC Consultative Group on Ocean Mapping was opened by the Chairman, Mr. Desmond P.D. Scott, at the Alfred-Wegener-Institut für Polar- und Meeresforschung in Bremerhaven, Germany, on Monday 24 April 1995, at 09:30.

Dr. Günter Giermann welcomed the participants on behalf of the Director of the Alfred-Wegener-Institut, Professor Dr. Max Tilzer, who was unable to attend because of another commitment.

The Technical Assistant Secretary for Ocean Mapping at the IOC, Mr. Dmitri Travin, welcomed the participants on behalf of the Secretary IOC, Dr. Gunnar Kullenberg.

Apologies were received from the Chief Editor GAPA, Dr. Gleb Udintsev. and the Chief Editor IBCWP, Dr Hou Wenfeng.

A full List of Participants is given in Annex II.

2. ADOPTION OF THE AGENDA

The Agenda was adopted with the addition of one item (see Annex I)

3. CONDUCT OF THE SESSION; DOCUMENTATION

The Chairman announced the arrangements for the Session and presented the general documentation.

4. INTERSESSIONAL IOC OCEAN MAPPING ACTIVITIES

The Chairmen of the IOC Ocean Mapping projects reported on the intersessional activities of their Committees and Editorial Boards.

A list of the Principal Meetings of the IOC Ocean Mapping bodies during 1990-95 is given in Annex III.

The assembly diagram of the General Bathymetric Chart of the Oceans is shown in Annex IV and the assembly diagrams of the regional International Bathymetric Chart projects are shown in Annex V.

4.1 PROGRESS AND PLANNED FUTURE DEVELOPMENTS FOR GEBCO

Sir Anthony Laughton, Chairman of the Joint IOC-IHO Guiding Committee for GEBCO, presented this item.

There had been intersessional meetings of the Guiding Committee at the offices of the Head Department of Navigation and Oceanography, Leningrad, USSR and the Scripps Institution of Oceanography, La Jolla, California, USA. During the same period the GEBCO Officers met at the offices of the British Oceanographic Data Centre, Liverpool, UK, and the Canadian Hydrographic Service, Ottawa, Canada.

The Guiding Committee's Terms of Reference had been redrafted and then submitted to and accepted by the IOC and IHO (Document IOC-IHO/GEBCO Officers-IX/3 Annex III).

A revision of GEBCO Sheet 5,12. South Atlantic, has been completed. The new map was currently being printed by the Canadian Hydrographic Service, Ottawa, and would be distributed very soon.

The GEBCO Guidelines are being updated to bring the production of GEBCO charts into line with new technologies. Parts 1 - GEBCO Organizational Framework, 2- Bathymetric Data Management. 3 - Digital Bathymetric Data (Single-Beam Echo Sounders) and 5- Underway Geophysics Data are published Part 4- Digital Bathymetric Data (Multibeam Echo Sounders) is still to be published.

There are two sub-committees. The Sub-Committee on Undersea Feature Names (SCUFN), a new name, is a continuing background activity. A major problem is the large number of names being generated by regional mapping activities. Another problem is the conflict with other naming committees around the world, such as the United States Board for Geographical Names (USBGN), who are also naming undersea features on a global scale,

Dr. Robert L. Fisher, the Chairman of SCUFN, is to be commended for his attention to the naming of features by others.

The IHO Gazetteer is being regularly maintained in digital form and is available on floppy- disk. Later it will be also available through the Internet on the IHO Bulletin Board.

Dr. Gary Robinson, NUTIS, has been researching the labelling of features and positioning of names for use within the GEBCO Digital Atlas (GDA).

The Sub-Committee on Digital Bathymetry (SCDB) is chaired by Dr. Meirion Jones. It is through this Sub-Committee that the GDA CD-ROM has been produced,

They are aware of the age of some of the GDA contours. Their revision, through the GDA, is more simple by a system of reviewers who keep their eye on the flow of new data, and also through invaluable NERC funding of the GEBCO Bathymetric Editor (GBE) at IOSDL, Wormley, and the GDA Manager at POL, Liverpool,

The GBE is required to identify new bathymetric activities and surveys and to advise the Guiding Committee on the priorities for updating the GDA.

The first major dataset available for updating the GDA is a bathymetry of the Indian Ocean by Dr. Robert L. Fisher. This is being digitized by BODC under a special agreement and will be released incrementally' over the next few years for use in the GDA after publication elsewhere.

Although it is not yet ready to do so, it is still GEBCO's intention to produce a printed 6th edition, however it is neither possible to confirm a date or to identify an organisation to carry out the work.

The SCDB has recognised that simply digitizing contours is not enough. Grids are needed by ocean modellers. This is not a trivial problem, both the contours and the original soundings must be considered. The present standard grid in use, DBDB5 by the US Navy (also used in ETOP05), has several large errors and its sources are unknown.

Other technologies, such as satellite altimetry, are developing. They provide important information on the morphology of the seafloor, particularly' in areas of sparse echo-sounding coverage, but incorporation into a numerical chart is very difficult. A presentation was made at a recent SCDB meeting by Dr. Walter Smith of the NOAA Geoscience Laboratory in Washington which included "predicted" bathymetry, it provoked spirited discussions.

The centenary of GEBCO is approaching. It is suggested that a book on the history of GEBCO from its inception by Prince Albert I of Monaco should be written. By that time a fully integrated bathymetric system should be up and running.

4.2 PROGRESS AND PLANNED FUTURE DEVELOPMENTS FOR THE INTERNATIONAL GEOLOGICAL/GEOPHYSICAL ATLASES OF THE ATLANTIC AND PACIFIC OCEANS (GAPA)

The Deputy Editor GAPA, Mr. Desmond Scott, reported on the progress of this project

The Atlantic Ocean Atlas was published in 1991 and has now been fully distributed to contributors and to IOC Depository Libraries, and placed on sale. Its sales have been satisfactory but large stocks still remain unsold. It now sells for sterling £100 (\$165).

The main atlas sections, consisting of maps on both 1:30 M and 1:10 M scales cover bottom topography, magnetic, total intensity anomalies, free-air gravity anomalies, sea surface heights, geothermal data, earthquake epicenters and thickness of sedimentary cover. Larger scale maps are provided for regions, e.g. Mid-Atlantic Ridge, Caribbean Sea and others for detailed study (usually bottom topography, magnetic and gravity anomalies, and thickness of sediments, etc).

Compilation of the companion atlas for the Pacific Ocean is now well advanced. It is expected that it will be published in 1996. It was two thirds complete when it ran into financial difficulties and money was not available for printing in Russia. These financial difficulties have now been overcome after the Chief Editor, Dr. Gleb Udintsev, located more funding. Thanks to generous support from the Houston Advanced Research Center (HARC), who will pay \$76,000 to Kartografia, Moscow, for various work, and the National Geophysical Data Center (NGDC), NOS, NOAA, which will contribute \$10,000 for the dust cover, the production of the Atlas can continue. The introduction and main sections of this atlas will be similar to those provided in the Atlantic Ocean Atlas. The Pacific Ocean regions selected for detailed study, for which larger scale maps will be provided are the Okinawa Trough, Gulf of Alaska, East Pacific Rise, South China Sea, Japan Sea, Japan Trench, Sea of Okhotsk, Bering Sea and the New Zealand region.

A final meeting of the Central Editorial Board is scheduled to be held in September 1995. After this meeting the project will be terminated apart from printing, publication, distribution and sales.

4.3 PROGRESS AND PLANNED FUTURE DEVELOPMENTS FOR THE INTERNATIONAL BATHYMETRIC CHART OF THE MEDITERRANEAN AND ITS GEOLOGICAL/GEOPHYSICAL SERIES (IBCM)

Dr. Carlo Morelli, Chairman IBCM, informed the meeting on the progress that has been made with the IBCM.

The 1:1 and 1:5 Million scale maps of Gravity Anomalies (IBCM-G), Seismicity (IBCM-S) and Thickness of Plio-Quaternary Sediments (IBCM-PQ) have been published.

The Unconsolidated Bottom Surface Sediments (IBCM-Sed) series should be published during 1995/96.

The accompanying leaflets are in preparation.

The remaining map series, Magnetic Anomalies, has had problems. The available data are in the hands of the two editors for the Western and the Eastern Mediterranean with the exception of the Western Ionian Sea and the Eastern Adriatic.

The preparation of the second edition of the bathymetric chart series has started. All the analogue material is with the Chief Editor in St. Petersburg. New data are being included onto the 1:250.000 scale plotting sheets of the first edition by the Mediterranean Hydrographic Offices.

Because of the transition by most of the HOs to digital technology and the rapid influx of new multi-beam data, the Chief Editor hopes that the IBCM second edition will be prepared in digital form.

4.4 PROGRESS AND PLANNED FUTURE DEVELOPMENTS FOR THE INTERNATIONAL BATHYMETRIC CHART OF THE CARIBBEAN SEA AND GULF OF MEXICO (IBCCA)

Ing. Juan Lobo Zertuche, Chairman and Chief Editor of IBCCA, reported on the progress of this project to the meeting.

The fifth meeting of the Editorial Board of IBCCA took place in San Jose, Costa Rica, during November 1994. Ing. Juan Lobo Zertuche was voted in as Chairman and Chief Editor for IBCCA taking the place of Lie. Néstor Duch Gary who resigned the position in February, last year.

In the intercessional period there has been significant progress in some areas and none in others. The meeting facilitated sheet edge matching and the exchange of methodology and data.

The formal proposal by the Hydrographic Institute of Cuba to digitize the IBCCA bathymetric contours was reviewed at the meeting. Instead of delegating the responsibility of digitizing all IBCCA contours to one country, the possibility of each participating country submitting future sheets in digital (scanned) form was discussed. It was decided that Cuba would proceed with digitizing the sheets that have already been compiled and submitted to INEGI but that each country would strive to submit future sheets in digital form.

Bathymetry is complete for sheets 1-01, 1-05 and 1-06 and is nearly complete for sheets 1-02, 1-03 and 1-11. Sheets 1-07 and 1-08 are undergoing major revisions after being extensively reviewed. Considerable work has been done on sheets 1-13, 1-14 and 1-17.

Venezuela has already proceeded with digitizing of sheet 1-15 and part of 1-14, which have been submitted to INEGI in digital format using Arc/Info software. Some observations were made on the resolution used in the digitizing, as this was not convenient at the 1: 1,000,000 scale.

Sheet 1-09 has been printed. 600 copies of sheet 1-04 have been printed, however the Chief Editor was not satisfied with the printing of one of the colours. Final printing of this sheet has been delayed due to the main press at INEGI being in need of repair. Alternatives for printing are being discussed within the Editorial Board. Sheet 1-06 is almost ready for printing and will be the first sheet produced using a new automated system at INEGI for producing colour separates.

No progress has been made on sheet 1-12, the Costa Rican participants cite a lack of expertise and resources as the major deterrents to their progress, INEGI has offered to host a Costa Rican participant for a period of time to provide training in bathymetric compilation. NGDC has also offered to provide technical expertise and access to software and hardware to a visitor from the Geographic Institute of Costa Rica to help get the project started.

At the moment, only an informal acceptance of the responsibility' for sheets 1-10 and 1-16 has been received from the Service Hydrographique et Océanographique de la Marine (SHOM), France. No progress has been made on these sheets. It is unlikely that SHOM would start work on these sheets until it has completed its IBCEA commitments.

4.5 PROGRESS AND PLANNED FUTURE DEVELOPMENTS FOR THE INTERNATIONAL BATHYMETRIC CHART OF THE CENTRAL EASTERN ATLANTIC (IBCEA)

Ing. Gén. André Roubertou President IBCEA, informed the meeting on the progress that has been made.

No meetings of the Editorial Board for the IBCEA have taken place since the last meeting of the CGOM.

The Instituto Hidrográfico, Lisbon Portugal, intends to print a colour proof of sheet 1.01 shortly. The compilation of 1.03 is underway and should be published during 1996. The sheet coordinators have been asked to work with the BRIDGE project to ensure that all their multibeam data is included. Sheets 1.02 and 1.07 have not been started yet.

So far as is known, the Spanish Hydrographic Institute has not, as yet, prepared a schedule for sheets 1.04 and 1.05.

SHOM, France, have resumed compilation of sheet 1.08, following comments on the omission of recent data and the style of contouring. The sheet will be ready for printing shortly. The compilation of sheets 1.06 and 1.09 are in hand and colour proofs are expected soon. Proofs of the contours of these sheets and also the revised contours of sheet 1.08 were circulated at this meeting. Sheets 1.10 and 1.11 will be completed by the end of this year, printing is scheduled for 1996. Sheet 1.12 is scheduled to be printed in 1997.

All the contour data are available in digital form.

In view of the problems associated with the production of sheet 1.08, a meeting of the Editorial Board is imperative, and Brest or Lisbon are suggested as a venue during 1996.

4.6 PROGRESS AND PLANNED FUTURE DEVELOPMENTS FOR THE INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN INDIAN OCEAN (IBCWIO)

Professor Dr.-Ing. Werner Bettac, Chairman and Chief Editor IBCWIO, informed the meeting on the progress that has been made.

The 3rd meeting of IBCWIO was held during October 1994 in Zanzibar. Data have been received from various sources, and strong national support has been forthcoming. The project has been greatly advanced through the meeting.

The Russian Federation, through HDNO in St Petersburg, has joined the Editorial Board. The Republic of South Africa has expressed an interest in collaborating with IBCWIO, but has not yet joined the Editorial Board. No formal approach has been made to France.

Since the second meeting of the Editorial Board in 1990 there has been a significant change in the ability of most Member States to handle digital source material.

The Chief Editor will work with the Sheet Co-ordinators to identify their capabilities and the hardware and software now available in their institutions, with a view to furnishing them with any additional programmes needed to handle IBCWIO data. He will liaise with NGDC, Boulder, in order to supply members with digital material for their sheet areas.

The Sheet Assembly Diagram for IBCWIO has been modified and now consists of 21 smaller sheets.

BSH, Germany, is expected to print this chart series.

4.7 PROGRESS AND PLANNED FUTURE DEVELOPMENTS FOR THE INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN PACIFIC (IBCWP)

Mr. Desmond Scott presented a report on behalf of the Chief Editor, IBCWP.

There have been intersessional activities as a result of the first session of the EB-IBCWP, Tianjin, China, 12-15 October 1994. The Workshop on Data Sources and Map Compilation did not take place.

DESIGN AND ESTABLISHMENT OF AN IBCWP DATABASE

The design of an IBCWP database is being studied. This will include: the database format, data classification, coding, technical standards, rules of operation and quality control. In addition, it was noted that provision will have to be made for swath data and bathymetric contours.

PROGRESS WITH COMPILATION OF SHEETS OF THE IBCWP

Sea of Okhotsk and South-east Kamchatka

The first sheet in this region is now being compiled by the HDNO, St Petersburg; four 1:500,000 plotting sheets (three completed and one partially compiled) were submitted to the Officers meeting in November 1994. A colour proof of this sheet is expected to be ready in time for EB-IBCWP-II.

Japan Sea and waters surrounding Japan

No recent information, but it is understood that Japan is working on conversion and compilation work.

The Central Western Pacific

A sample plotting sheet from an area within Malaysian waters, produced using CARIS software, was presented by Malaysia. China is collecting bathymetric data from ocean surveys in the East and South China Seas and from surveys by other countries. Vietnam has accepted responsibility for compilation and publication of six sheets within this region. The Philippines will contribute bathymetric data in analogue form.

Australia has confirmed that approval has been given for the release of the AGSO's bathymetric data to GEBCO and the DCDB, and also to NMDIS for inclusion in the WDC-D and IBCWP databases.

New Zealand and the SOPAC Secretariat in Suva, Fiji, have registered their interests in participating in the project.

The Group recommended that the planned IBCWP workshop should be held in the region.

5. DIGITIZATION OF THE REGIONAL OCEAN MAPPING PROJECTS

IBCCA is currently digitizing its sheets (See 4.4 above).

In the IBCEA project, SHOM is producing its sheets in digital form. The GEBCO Bathymetric Editor was asked to contact Ing. en Chef Gilles Bessero in order to obtain from EPSHOM details of their digital bathymetry format.

The meeting agreed that all digital versions of the maps should be sent to the GEBCO Bathymetric Editor prior to their inclusion in the GDA, as should all the paper maps, too.

6. GEBCO DIGITAL ATLAS (GDA)

6.1 UPDATING THE GDA

Mr. Peter Hunter, GEBCO Bathymetric Editor, presented a diagram of the coverage of published and unpublished maps and mapping projects which could provide contour data that would be suitable for consideration for updating the GDA (See Annex VI).

The majority of new contours are expected to come through the IOC's International Bathymetric Chart projects. Although a significant amount of new data will come from other sources.

The principal regions where there may be sufficient data are: the Arctic, Antarctic, South-west Pacific and North-east Atlantic Oceans.

The greater Indian Ocean is currently being completely recontoured through the outstanding 'Alliance Exotique' project work by Dr. Robert L. Fisher of Scripps Institution. He has been supplying the BODC with large quantities of new contours and tracks for this region for them to digitize. The new contours will be included into the GDA as soon as Dr. Fisher publishes them for the purposes of the 'Alliance Exotique'. This monumental task will be responsible for updating almost 20 per cent of the contours of the GDA.

6.2 GRIDDED BATHYMETRY

The SCDB is looking at the problems associated with gridding the GDA. A small group is using the recently produced contours of the revised sheet 5.12 to test different theories and algorithms.

Mr. Hunter drew the attention of the meeting to a new global, gridded bathymetry called DTM5. It is a CD-ROM produced by Getech at the Department of Earth Sciences at Leeds University, UK. It draws heavily on the US Navy product ETOPO5. The meeting had reservations about the background of DTM5 and Getech's principles. Mr. Hunter said that he would investigate the product further.

DMA, Washington DC, USA, have expressed an interest in using the GDA in some of their products. It was felt that this might make 'tracking' of the GDA users difficult and could lead to problems in providing these DMA users with revisions of up-to-date bathymetry.

7. WORLD VECTOR SHORELINE (WVS)

It was reported that the DMA is updating WVS for release later this year

All the regional projects, with the exception of the IBCM, are using the WVS for their coastlines. The IBCM will use it for its second edition.

8. PROGRESS AND PLANNED FUTURE DEVELOPMENTS WITH THE REGIONAL PROJECTS' GEOLOGICAL/GEOPHYSICAL SERIES

The IBCM has already published three of these series (See item 4.3 above).

The meeting was informed that the IBCCA has information and data available to compile some maps. Ms. Lisa Taylor at NGDC has started working on this. It was suggested that the IBCM sheets should be sent to her to help her work.

It was pointed out that a sediment thickness map could have important political results in view of the UNCLOS, as they could be used as evidence for a claim by a member coastal state. This probably does not apply to the Mediterranean region, however the other regional chart series should beware.

9. REPORT ON THE IOC'S OCEAN MAPPING ACTIVITIES FOR SUBMISSION TO THE EIGHTEENTH SESSION OF THE IOC ASSEMBLY

The Chairman presented a draft report (doc. IOC/INF-988) for the consideration of the Group.

He was asked to include an acknowledgement of the NERC funding in support of GEBCO and to also consider the requirements of physical oceanographers and GOOS in terms of bathymetry, noting the fact that Japan amongst others considers the latter of great importance.

A small drafting group was authorised to prepare a text for a draft resolution on 'Ocean Mapping', for submission, through the Secretary IOC, to the IOC Assembly (Paris, 13-27 June 1995) (See Annex VII).

10. SALES AND PUBLICITY

10.1 SALES

The Alfred-Wegener-Institut was asked if they would provide a stock of the maps that would comprise the International Bathymetric Chart of the Weddell Sea, or would prefer to handle their distribution themselves. AWI agreed to investigate this further as no details were yet available on the printing costs.

10.2 PUBLICITY

Rear Admiral Andreasen reported that the IHO included details of GEBCO maps in their catalogue. He also reported that he had contacted several TV stations through the centre in Monaco.

It was pointed out that publicity is not very good and the question was asked whether IOC should pay for expert marketing advice. It was noted that Mr. Travin already acts as the IOC Ocean Mapping publicity officer. It was suggested that CGOM should adopt the term "Marketing" in place of "Publicity".

Amongst ideas put forward were: every scientific research cruise should have copies of the GDA and the other IOC map series; each IOC delegate should receive a copy of the GDA brochure; use should be made of the National Commissions; a formal letter should be sent, not just a brochure; and a direct approach to commerce, industry, tourism and schools is required. The general public is very interested in environmental issues now.

Other ideas included: providing copies to cruise liners for their passengers interest; plugging into computer arcades; providing it to merchant ships as an additional route planning aid and substituting the GDA for the bathymetry used by many airlines for their on-line route graphics.

The purpose is to increase the visibility of IOC Mapping and other bathymetric products.

Sir Anthony Laughton agreed to talk to Dr. Nicholas Flemming, the Secretary of EuroGOOS.

It was suggested that an *ad hoc* session should be proposed for the IOC Assembly to discuss IOC's Ocean Mapping programme.

Dr. Morelli said that he would make contact with people in Italy who might be interested in ocean mapping. He asked for 20 copies of the GDA brochure, Mr. Hunter agreed to provide these.

11. PRESENTATION OF A NEW BATHYMETRIC CHART OF THE WEDDELL SEA

Dr. Heinrich Hinze, on behalf of AWI, presented a prototype bathymetric map of a part of the Weddell Sea. It is one of a planned series of 1:1 Million scale charts based on the GEBCO plotting sheet scheme covering the Weddell Sea. This new chart covers the area of plotting sheet 567 and will be published later this year. The other sheets in the series are at an advanced state of preparation.

He asked for comments on the design and appearance of the chart to enable AWI to present the information that this chart contains in the most useful way possible.

The chart is also available in digital format.

Dr. Hinze also demonstrated a novel method of displaying the location of sounding data on other maps from both single- and multibeam echo sounder sources. Using dots for multibeam coverage would obscure the more important contour information so AWI had developed a method based on a small cross which showed the occurrence of any data whatsoever in the 1' by 1' square that it indicated.

12. ANY OTHER BUSINESS

12.1 TRAINING COURSES

Dr. Gunter Giermann reported that there will be a training course on board the German research vessel METEOR during December 1995. The Course Director will be Professor Bettac. This course is part of a long series (going back several decades) which mainly concerns coastal dynamics. The German IOC Trust Fund contribution for these courses will end in 1996. He stated that if CGOM feel that these courses should continue then their strong support will be needed.

The IHO reported that there is an IHO training programme for hydrography located at Trieste.

13. DATE AND PLACE OF THE NEXT SESSION

In view of the high priority that has been given to Ocean Mapping by IOC, the next session, CGOM VI, should be held in two years time during the first half of 1997. The new Southampton Oceanography Centre in the United Kingdom which opens later this year was suggested. Mr. Hunter will look into this possibility.

14. ADOPTION OF THE SUMMARY REPORT

The Committee accepted that the first draft of the Summary Report would be prepared after the meeting and would be distributed to the participants.

15. CLOSURE OF THE MEETING

The Chairman closed the Session at 14.30 on Wednesday, 25 April. He thanked the Director and staff of the Alfred-Wegener-Institut for their expert hosting which had once again led to a successful session of the CGOM in Bremerhaven.

ANNEX I

AGENDA

1. OPENING OF THE SESSION
2. ADOPTION OF THE AGENDA
3. CONDUCT OF THE SESSION; DOCUMENTATION
4. INTERSESSIONAL IOC OCEAN MAPPING ACTIVITIES
 - 4.1 Progress and planned future developments for the General Bathymetric Chart of the Oceans (GEBCO)
 - 4.2 Progress and planned future developments for the International Geological/Geophysical Atlases of the Atlantic and Pacific Oceans (GAPA)
 - 4.3 Progress and planned future developments for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (IBCM)
 - 4.4 Progress and planned future developments for the International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA)
 - 4.5 Progress and planned future developments for the International Bathymetric Chart of the Central Eastern Atlantic (IBCEA)
 - 4.6 Progress and planned future developments for the International Bathymetric Chart of the Western Indian Ocean (IBCWIO)
 - 4.7 Progress and planned future developments for the International Bathymetric Chart of the Western Pacific (IBCWP)
5. DIGITIZATION OF THE REGIONAL OCEAN MAPPING PROJECTS
6. GEBCO DIGITAL ATLAS (GDA) (including demonstration)
 - 6.1 Updating the GDA
 - 6.2 Gridded Bathymetry
7. WORLD VECTOR SHORELINE (WVS)
8. PROGRESS AND PLANNED FUTURE DEVELOPMENTS WITH THE REGIONAL PROJECTS' GEOLOGICAL/GEOPHYSICAL SERIES
- 9.. REPORT ON IOC'S OCEAN MAPPING ACTIVITIES FOR SUBMISSION TO THE EIGHTEENTH SESSION OF THE IOC ASSEMBLY

10. SALES AND PUBLICITY

10.1 Sales

10.2 Publicity

11. PRESENTATION OF A NEW BATHYMETRIC CHART OF THE WEDDELL SEA

12. ANY OTHER BUSINESS

12.1 Training Courses

13. DATE AND PLACE OF THE NEXT SESSION

14. ADOPTION OF THE SUMMARY REPORT

15. CLOSURE OF THE SESSION

ANNEX II

LIST OF PARTICIPANTS

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ANNEX III

LIST OF MEETINGS OF IOC OCEAN MAPPING BODIES SINCE THE FOURTH SESSION OF
THE CONSULTATIVE GROUP ON OCEAN MAPPING (CGOM-IV)
22-24 OCTOBER 1990

Fourth Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monte Carlo, 22-24 October 1990 (doc. IOC/CGOM-IV/3);

Fifth Session of the IOC Consultative Group on Ocean Mapping (CGOM), Bremerhaven, Germany, 24-25 April 1995 (doc. IOC/CGOM-V/3);

Thirteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), Leningrad, USSR 10-12 June 1991 (doc. IOC-IHO/GEBCO-XIII/3);

Eighth Meeting of the GEBCO Officers, Bidston, Birkenhead, UK, 13-15 April 1992 (doc. IOC-IHO/GEBCO Officers-VIII/3);

Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), La Jolla, California, USA, 4-6 May 1993 (doc. IOC-IHO/GEBCO-XIV/3);

Ninth Meeting of the GEBCO Officers, Ottawa, Canada, 30 May-1 June 1994, (doc. IOC-IHO/GEBCO Officers-IX/3);

Ninth Meeting of the GEBCO Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features, Leningrad, USSR, 5-7 June 1991 (doc. IOC-IHO/GEBCO SCGN-IX/3);

Tenth Meeting of the GEBCO Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features, La Jolla, California, USA, 29 April-3 May 1993 (doc. IOC-IHO/GEBCO SCGN-X/3);

Eighth Meeting of the GEBCO Sub-Committee on Digital Bathymetry, Leningrad, USSR 5-7 June 1991;

Ninth Meeting of the GEBCO Sub-Committee on Digital Bathymetry, Bidston, Birkenhead, UK, 8-10 April 1992 (doc. IOC-IHO/GEBCO SCDB-IX/3);

Tenth Meeting of the GEBCO Sub-Committee on Digital Bathymetry, Boulder, Colorado, 29-30 April, and La Jolla, California, USA, 3 May 1993;

Eleventh Meeting of the GEBCO Sub-Committee on Digital Bathymetry: Fredericton, Canada, 25-27 May 1994 (doc. IOC-IHO/GEBCO SCDB-XI/3);

Eleventh Session of the Central Editorial Board for the International Geological/Geophysical Atlases of the Atlantic and Pacific Oceans (GAPA), Tokyo, 9-13 September 1991;

Twelfth Session of the Central Editorial Board for the International Geological/Geophysical Atlases of the Atlantic and Pacific Oceans (GAPA), Tokyo. 22-24 August 1992;

Thirteenth Session of the Central Editorial Board for the International Geological/Geophysical Atlases of the Atlantic and Pacific Oceans (GAPA), Seattle, USA, 7-9 October 1993:

Fifth Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (IBCM), Trieste, Italy, 26-28 June 1991 (doc. IOC/EB-IBCM-V/3);

Informal Meeting for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (IBCM), Trieste. 12-13 October 1992 (doc. IOC/INF-911);

Informal Meeting for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (IBCM), Paris, 26 February and 1 March 1993 (doc. IOC/INF-925);

Sixth Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (IBCM). Jerusalem, Israel, 1-6 November 1993 (doc. IOC/EB-IBCM-VI/3);

Informal Consultations of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (IBCM), Paris, 4 July 1994 (doc. IOC/INF-996);

Informal Consultations of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its "Geological/Geophysical Series (IBCM), La Valletta, Malta, 28-29 March 1995 (report in preparation);

Fourth Meeting of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA), Havana, Cuba. 24-26 March 1992 (doc. IOC/EB-IBCCA-IV/3);

Second Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA), Boulder, Colorado, USA, 15-16 December 1993 (doc. IOC/INF-955);

Fifth Meeting of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA), San Jose, Costa Rica, 21-22 November 1994 (doc. IOC/EB-IBCCA-V/3);

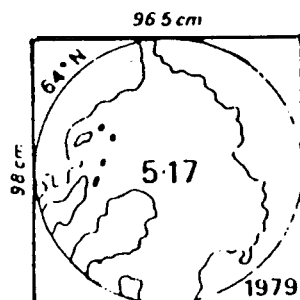
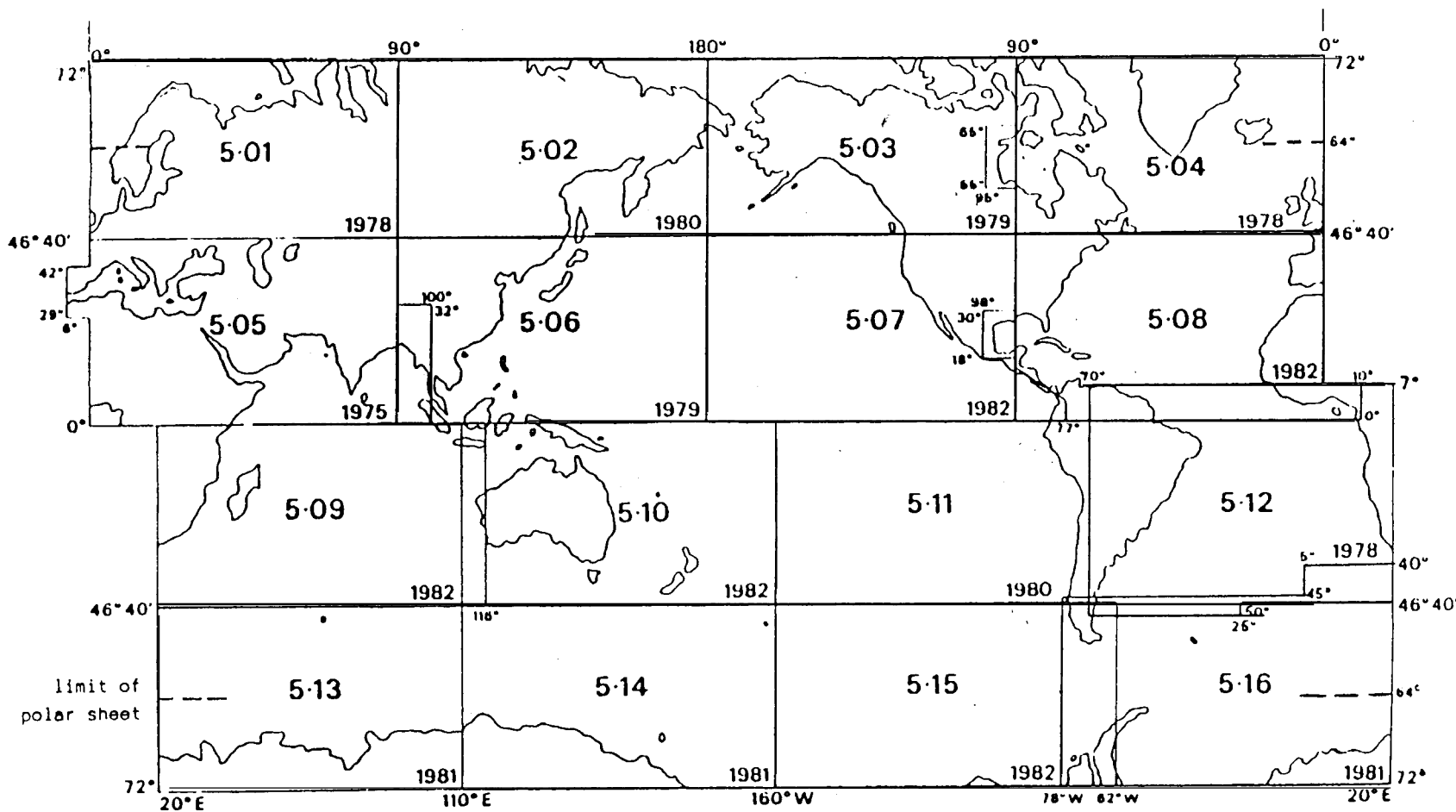
Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IBCWIO), Zanzibar, Tanzania, 3-7 October 1994 (doc. IOC/EB-IBCWIO-III/3);

First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Pacific (IBCWP), Tianjin, China, 12-15 October 1993 (doc. IOC/EB-IBCWP-I/3);

First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific (IBCWP), Bali, Indonesia. 20-21 November 1994 (doc. IOC/EB-IBCWP-Off.I/3)

ANNEX IV

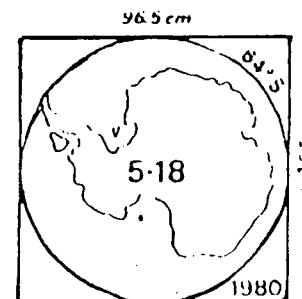
ASSEMBLY DIAGRAM OF THE GENERAL BATHYMETRIC CHART OF THE OCEANS (GEBCO) scale 1:1 million at the Equator



WORLD MAP

The 5th edition of GEBCO has been assembled into a single map of the world at a scale of 1 35 000 000 with the polar regions at 1 25 000 000

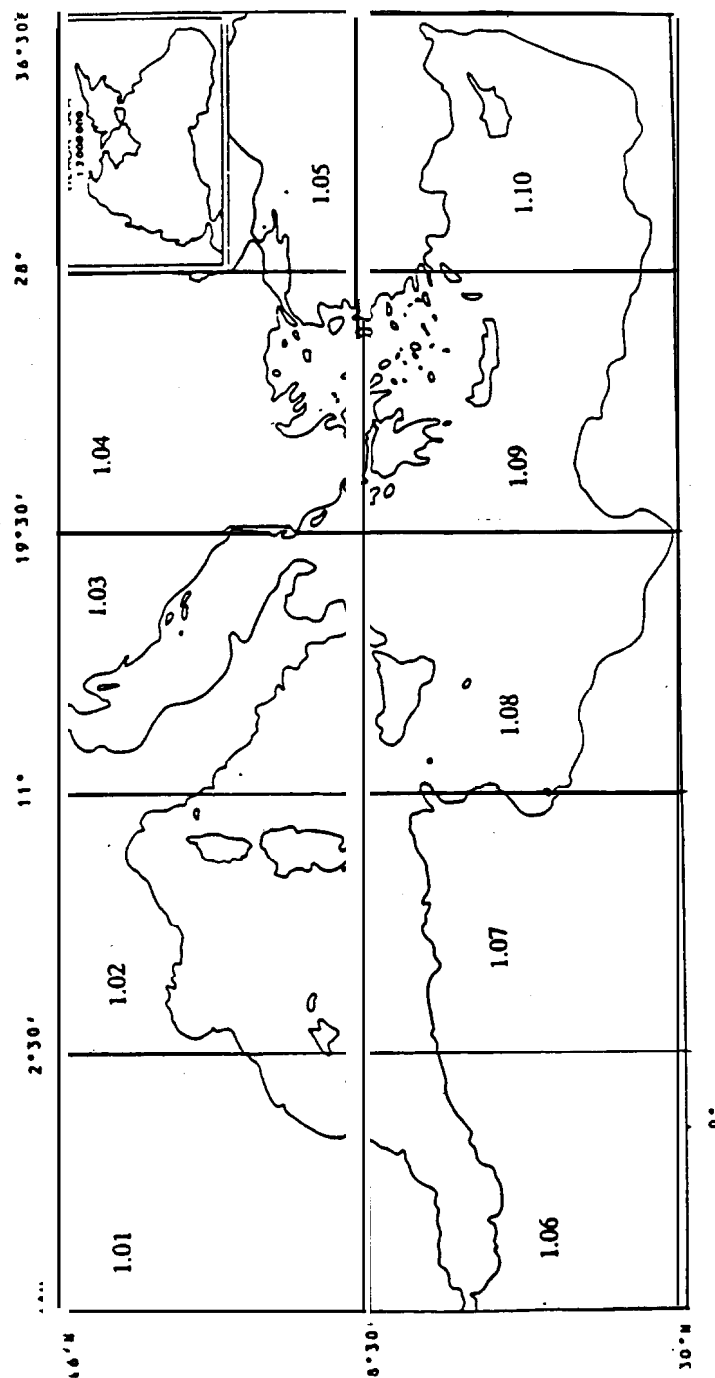
This world map is identified as GEBCO 5.00



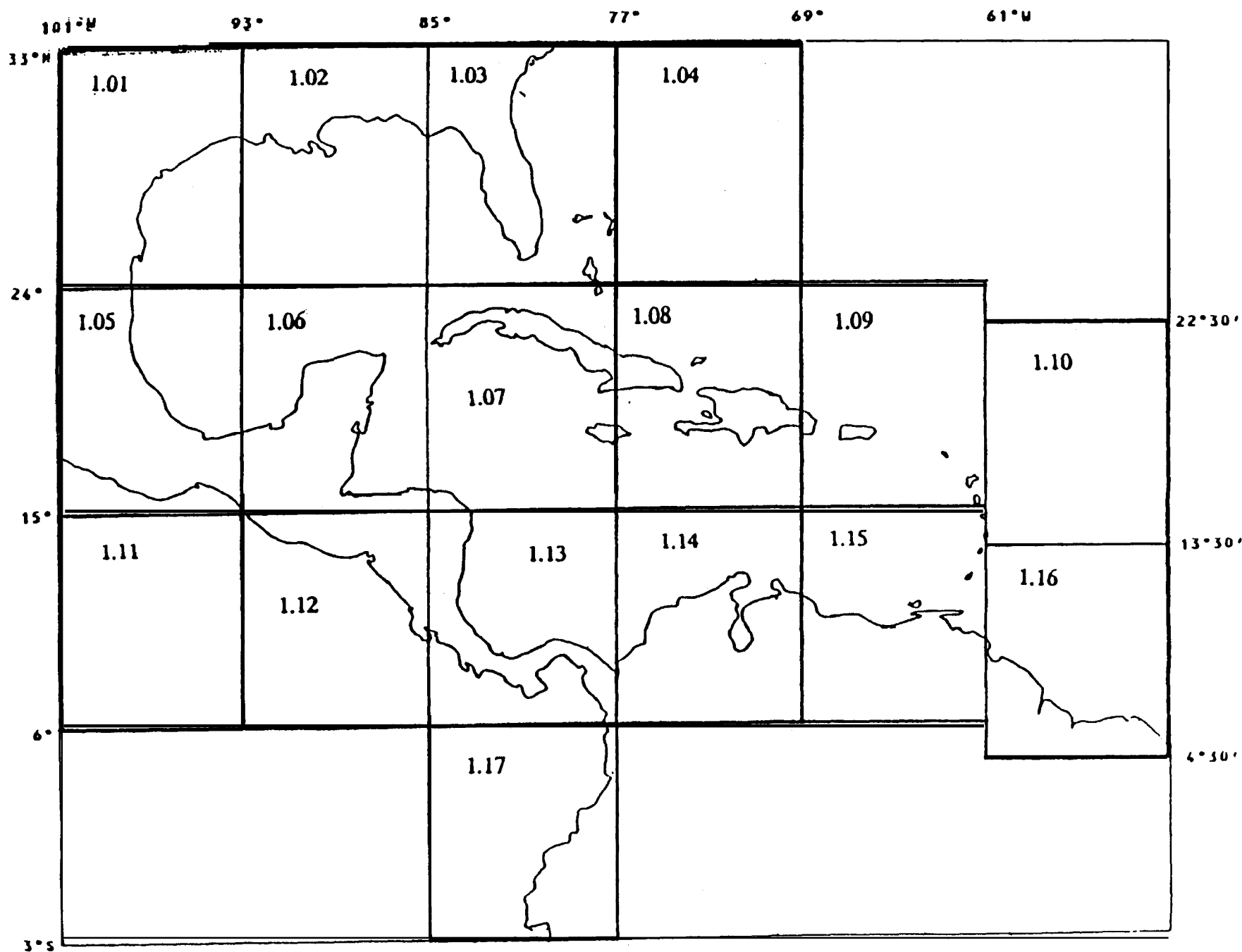
ANNEX v

ASSEMBLY DIAGRAMS OF REGIONAL INTERNATIONAL BATHYMETRIC CHART
PROJECTS

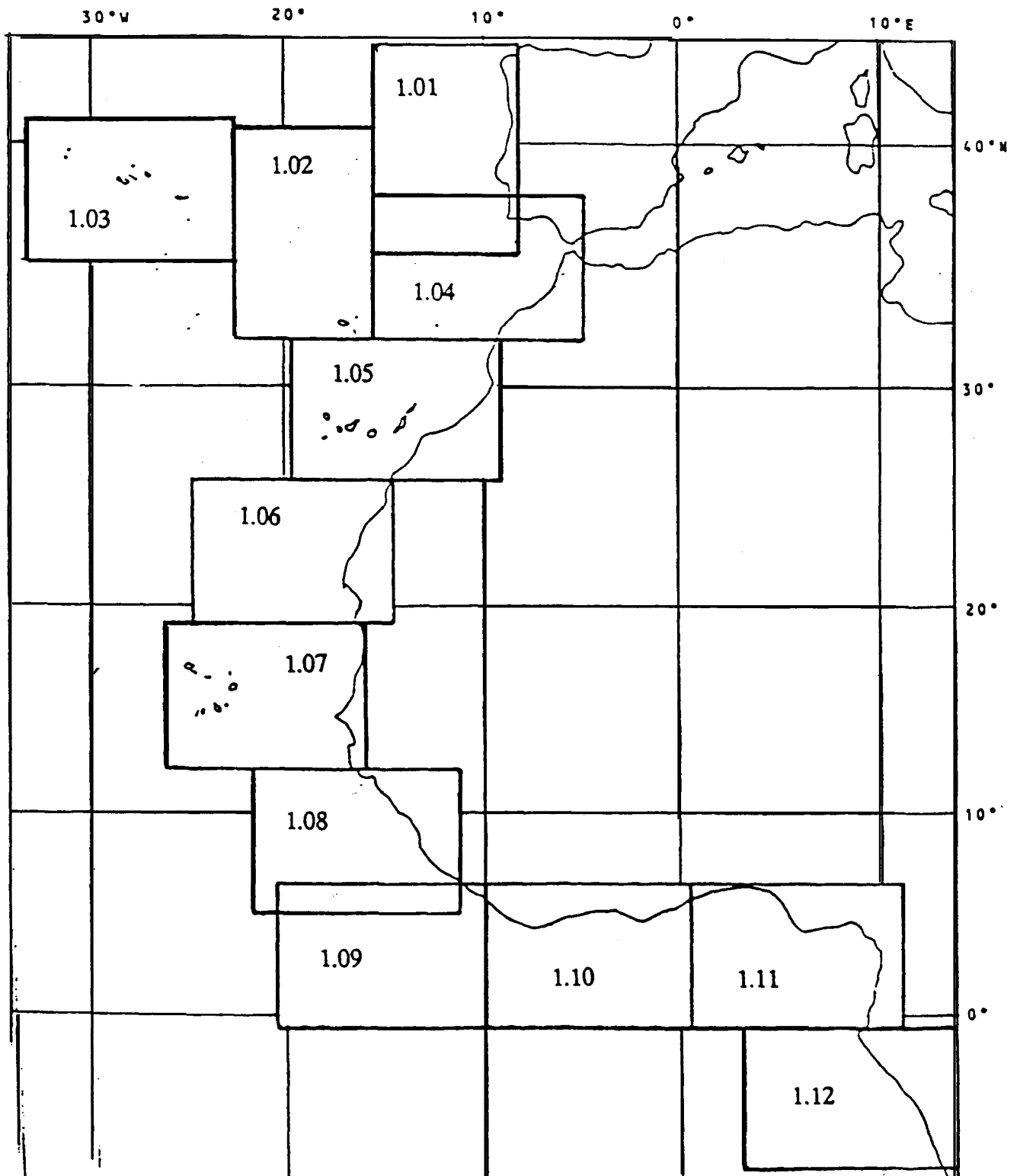
ASSEMBLY DIAGRAM OF THE
INTERNATIONAL BATHYMETRIC CHART OF THE MEDITERRANEAN (IBCM)
scale 1:1 million at 38°N



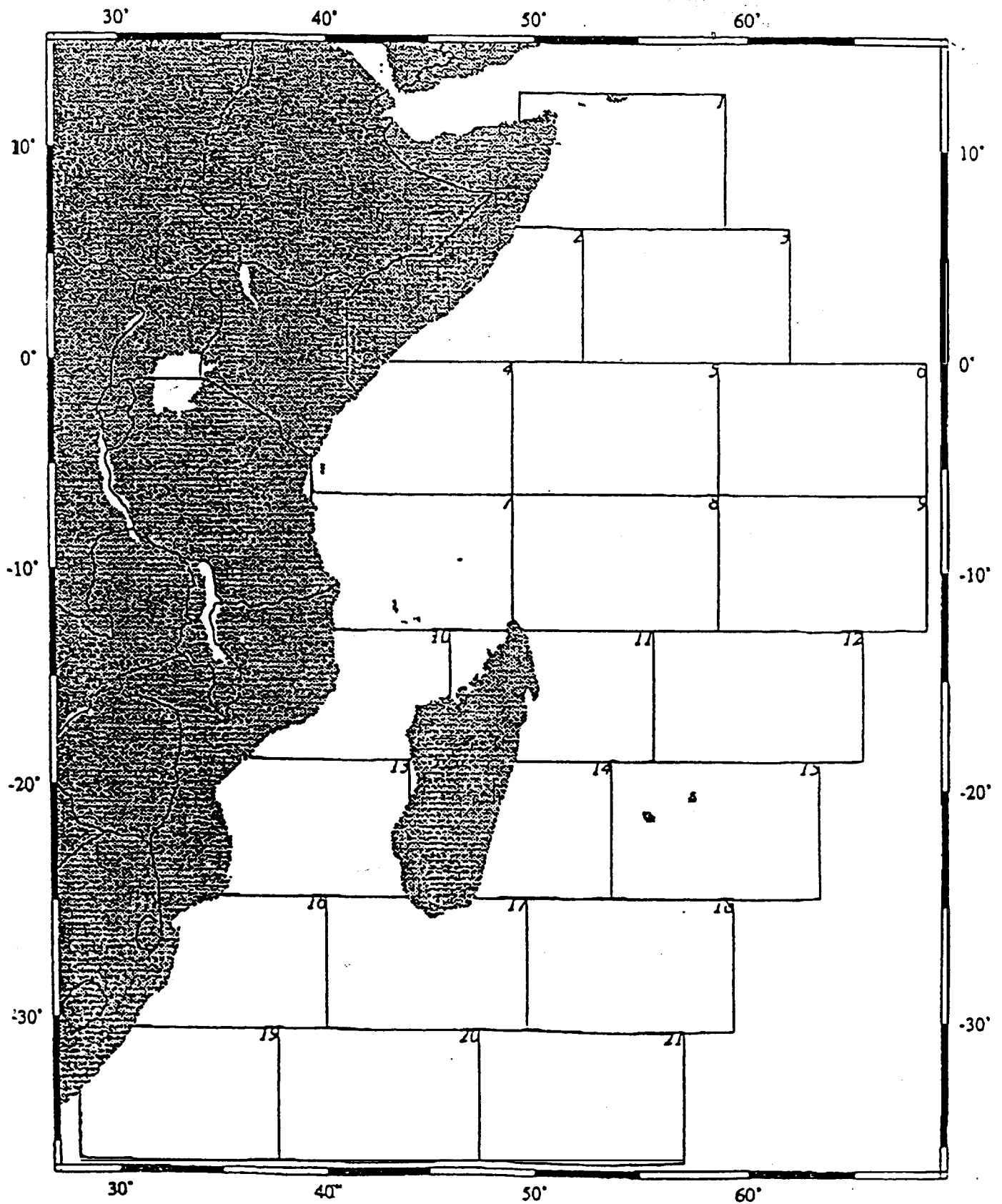
ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE
CARIBBEAN SEA AND GULF OF MEXICO (IBCCA)
scale 1:1 million at 15°N



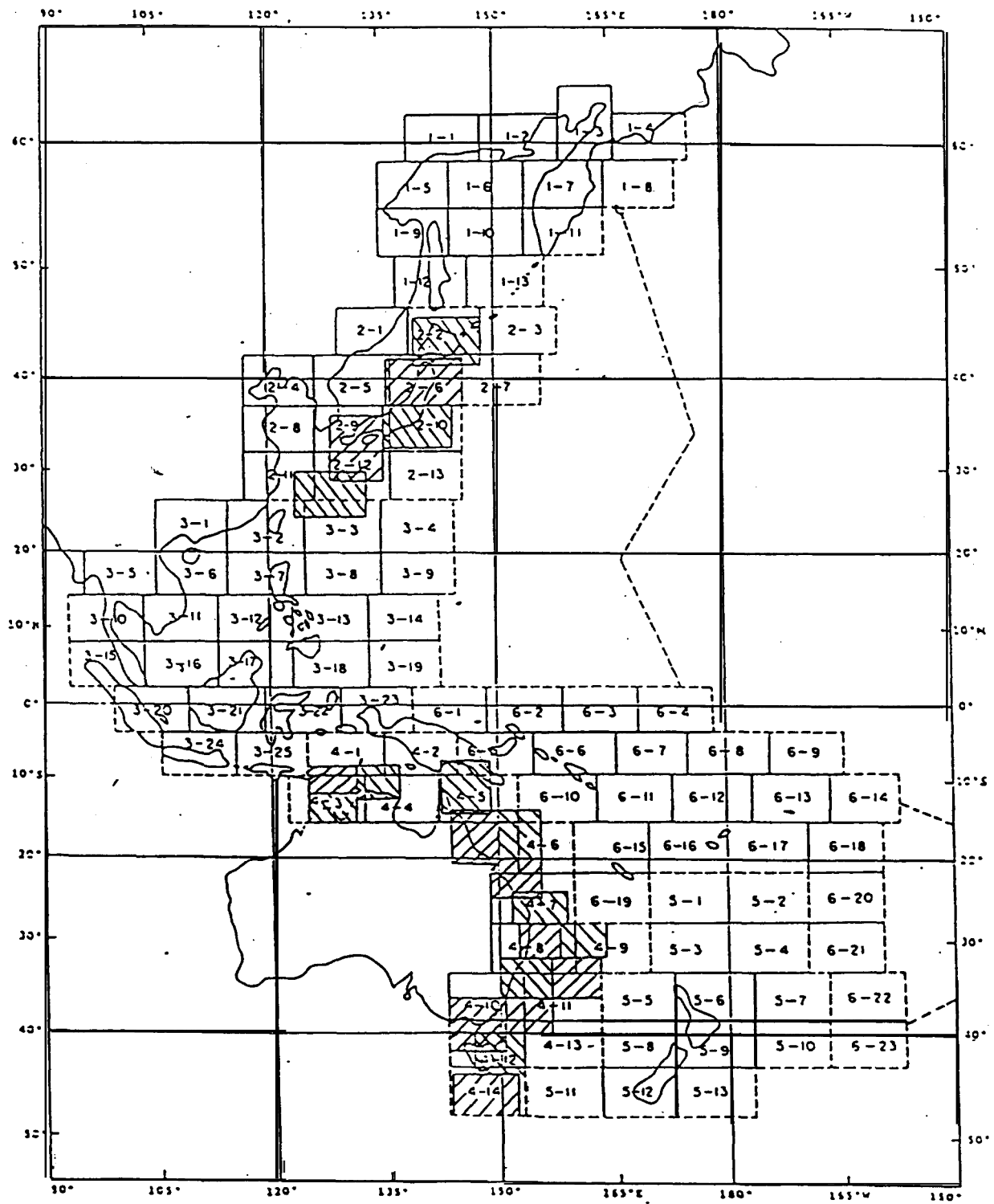
ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE
CENTRAL EASTERN ATLANTIC (IBCEA)
scale 1:1 million at 20°N



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

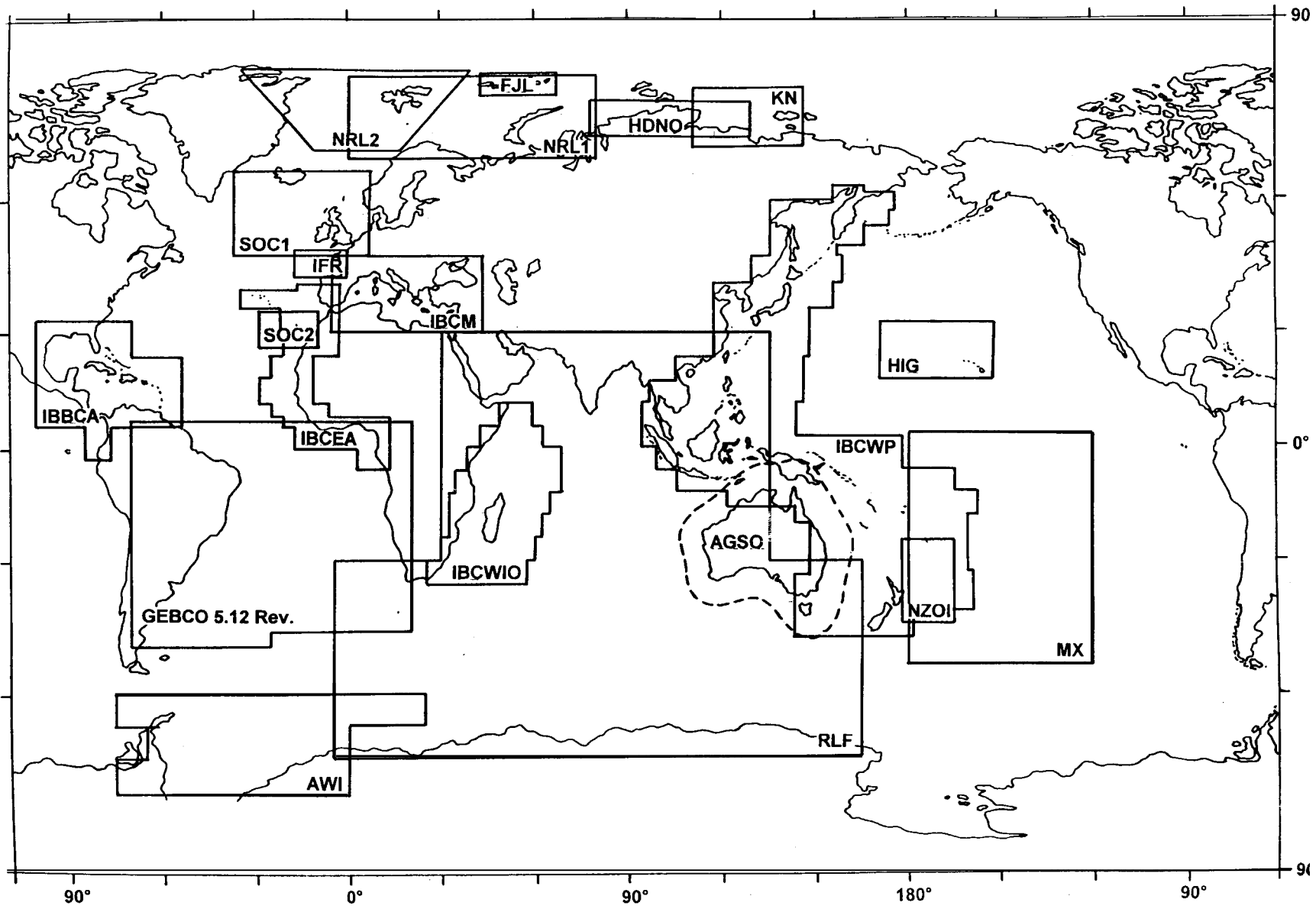


ASSEMBLY DIAGRAM OF THE INTERNATIONAL BATHYMETRIC CHART OF THE
WESTERN PACIFIC (IBCWP)
scale 1:1 million at 33° latitude



ANNEX VI

COVERAGE DIAGRAM OF MAPS & MAPPING PROJECTS THAT WOULD BE SUITABLE
FOR UPDATING THE GDA



Key to Bathymetric Maps

AGSO	Offshore Resource Map Series (ORMS) - Australian Geological Survey Organisation, scale 1:1 million @, 33°S,
AWI	Bathymetric Charts of the Weddell Sea - Alfred Wegener Institute for Polar and Marine Research, scale 1:1 million.
FJL	Bathymetric Map of the Franz Josef Land Area - Matishov et al.. Murmansk (1995), scale 1:500,000 @, 80° N.
HDNO	Bathymetric maps the Kara and Laptev Seas - Head Department of Navigation and oceanography (1993), (digital files).
HIG	Northwestern Hawaii Islands Merged Bathymetry and Topography -Duennebier et al.. Hawaii Institute of Geophysics and Planetology (1995). scale 1:4 million.
IBBCA	IBC Caribbean Sea and Gulf of Mexico. scale 1:1 million @: 15°N,
IBCEA	IBC Central Eastern Atlantic, scale 1:1 million @ 20°N.
IBCM	IBC Mediterranean, scale 1:1 million @ 38°N.
IBCWIO	IBC Western Indian Ocean, scale 1:1 million@ the Equator.
IBCWP	IBC Western Pacific, scale 1:1 million @ 33° latitude,
IFR	New Bathymetric Map of the Bay of Biscay - Sibuet et al., IFREMER (1994), scale 1:2.4 million @ 41°N.
KN	Bathymetry of the Laptev Seas - Kassens, GEOMAR.
MX	Bathymetry of Southcentral Pacific - Mammerickx. Scripps Institution of Oceanography} (1992), scale 1:6.4 million @ Equator.
NRL1	Bathymetry of the Barents and Kara Seas - Cherkis, Naval Research Lab. (1991), scale 1:2.3 million @ 72°N.
NRL2	Regional Bathymetry of the Northern Norwegian - Greenland Seas - Cherkis,NRL. (1994), scale 1:3 million.
NZOI	Oceanic Chart Series - New Zealand Institute of Water and Atmospheric Research (NZOI), scale 1:1 million @ 46°S.
RLF	Bathymetry of the Indian Ocean (Alliance Exotique) - Fisher, Scripps Institution of Oceanography}', scale 1:2 million.
SOC1	Bathymetry of the Northeast Atlantic, sheets 1 & 2- Southampton Oceanography Centre, scale 1:1 million,
SOC2	Bathymetry of the Madeira and Canary Abyssal Plains - SOC., scale 1:1 million.

ANNEX VII

DRAFT RESOLUTION ON 'OCEAN MAPPING' FOR SUBMISSION TO THE EIGHTEENTH
SESSION OF THE IOC ASSEMBLY

Paris, 13-27 June 1995

Submitted by the Chairman, IOC Consultative Group on Ocean Mapping (CGOM) on behalf of the group
(This draft Resolution was approved in principle by the CGOM at its fifth meeting, Bremerhaven, 24-25
April 1995, and finalised by correspondence)

The Intergovernmental Oceanographic Commission,

Noting that the Assembly at its seventeenth session (March 1993) 'stressed that the Ocean Mapping
programme is a priority action of the IOC and should be provided with necessary support.' (doe.
SC/MD/101, paragraph 120)

Recognizing:

- (i) that the demand for an authoritative and global description of the bathymetry of the world's oceans from physical and biological oceanographers who are involved in modelling the ocean environment and predicting changes in global circulation, is steadily becoming more insistent, in addition to the increasingly fine resolution requirements of marine geologists and geophysicists,
- (ii) that on a global scale, existing bathymetric data are widely scattered and of very variable quality in depth and position, but that there are now available high quality multibeam swath sounding techniques and accurate position control systems,
- (iii) the established fact that repeated routine ocean observations, as anticipated in the IOC's Global Ocean Observing System (GOOS), will be required to monitor oceanic change, and that this will require a secure framework of global bathymetry,
- (iv) that the entry into force of the UN Convention on the Law of the Sea (UNCLOS) in November 1994 brings into focus the needs of coastal states to define, claim and possibly exploit resources within national jurisdiction, and hence the requirement for detailed and accurate bathymetry of the margins,

Believing that IOC's Ocean Mapping products, if marketed more widely and skilfully, could increase the visibility of the Commission throughout the world,

Instructs the Secretary:

- (i) to initiate discussions on how to achieve, in collaboration with the International Hydrographic Organization, comprehensive and well co-ordinated bathymetric surveys of areas of scientific priority in the world's oceans in the forthcoming decade, including bathymetric mapping in support of considerations related to the UN Convention on the Law of the Sea; and
- (ii) in the interim, to investigate the possibility of improving the level of funding in the regular programme for Ocean Mapping, with a view to ensuring that the biennial cycle of meetings of the Consultative Group on Ocean Mapping (CGOM) and the Regional Ocean Mapping projects is maintained, in order to retain the necessary impetus in the various activities of these bodies, with, in particular, the absolute requirement for a meeting of the Editorial Board for the International Bathymetric Chart of the Central Eastern Atlantic (IBCEA) (possibly in Lisbon or Brest) in 1996, and of CGOM early in 1997.

82. Second Meeting of the UNEP-IOC-ASPEI Global Task Team on the Implications of climate Change on Coral Reefs
83. Seventh Session of the JSC Ocean Observing System Development Panel
84. Fourth Session of the IODE Group of Experts on Marine Information Management
85. Sixth Session of the IOC Editorial Board for the international Bathymetric chart of the Mediterranean and its Geological/Geophysical Series
86. Fourth Session of the Joint IOC-JGOFS Panel on Carbon Dioxide
87. First Session of the IOC Editorial Board for the international Bathymetric Chart of the Western Pacific
88. Eighth Session of the JSC Ocean Observing System Development Panel
89. Ninth Session of the JSC Ocean Observing System Development Panel
90. Sixth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
91. First Session of the IOC-FAO Group of Experts on OSLR for the IOCINCWIO Region
92. Fifth Session of the Joint IOC-JGOFS CO₂ Advisory Panel Meeting
93. Tenth Session of the JSC Ocean Observing System Development Panel
94. First Session of the Joint CMM-IGOSS-IODE Sub-group on Ocean Satellites and Remote Sensing
95. Third Session of the IOC Editorial Board for the International Chart of the Western Indian Ocean
96. Fourth Session of the IOC Group of Experts on the Global Sea Level Observing System
97. Joint Meeting of GEMSI and GEEP Core Groups
98. First Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
99. Second International Meeting of Scientific and Technical Experts on Climate Change and the Oceans
100. First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific
101. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
102. Second session of the Joint Scientific and Technical Committee for Global Ocean Observing System
103. Fifteenth Session of the Joint IOC-IHO Committee for the General Bathymetric Chart of the Oceans
104. Fifth Session of the IOC Consultative Group on Ocean Mapping