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Reports of Meetings of Experts and Equivalent Bodies

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Tenth Session

East-West Centre

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1. OPENING OF THE SESSION

The Tenth Session of the Officers Committee for the joint IOC-IHO General Bathymetric Chart of the Oceans (GEBCO) was held at the East-West Center, Honolulu, Hawaii. Sir Anthony Laughton, Chairman GEBCO, opened the Session at 0900 on Friday 3 May 1996.

In his opening address he commented that the usual format for GEBCO Officers sessions had been altered to avoid the duplication of discussions conducted by the GEBCO Officers and the preceding meeting of the GEBCO Sub-Committee on Digital Bathymetry (SCDB). He acknowledged that the rapid technological advances in a number of disciplines impacted on several GEBCO activities and had persuaded him to accept an invitation to attend SCDB to gain a more detailed acquaintance with these changes and to assess their likely effect on future plans for GEBCO.

He thanked Dr. Meirion T. Jones (Chairman of SCDB) for an informative and lively three days of debate and concluded that, for his part, the experiment to join the SCDB meeting had been extremely worthwhile.

The Chairman welcomed the participants, some of whom were attending a GEBCO Officers Session for the first time. In introducing Mr. Brian Harper as the new Permanent Secretary, he also recorded his deep gratitude for Desmond Scott's work as the previous incumbent.

A full List of Participants is given in Annex X.

Apologies for absence had been received from:

Captain Hugo Gorziglia
Mr. Alexis E Hadjiantoniou
Dr. Larry Mayer
Mr. David Monahan
Dr. Ron Macnab
Dr. Andrey Popov
Mr. Dmitri Travin
Dr. Gleb Udinstev
Dr. Ian Wright

2. CONDUCT OF THE SESSION

2.1 ADOPTION OF THE AGENDA

The Chairman said that as a result of discussion in the preceding SCDB meeting he wished to add 3 related items. It was agreed that these should be grouped under a new item: 7. GEBCO Digital Atlas (GDA). Subsequent items to be re-numbered (Annex I).

2.2 DOCUMENTATION; ADMINISTRATIVE ARRANGEMENTS, ETC .

The Permanent Secretary introduced the List of Documents (Annex II).

Other additional documents were tabled:

Letter from Dr. José Corvalán to Dr. Meirion T. Jones dated 9 February 1996.

3. COMPOSITION OF THE GUIDING COMMITTEE AND ITS SUB-COMMITTEES

3.1 GUIDING COMMITTEE

It was noted that since his appointment in 1992, Capitán de Navio J. M. Fernández de la Puente had not attended either a GEBCO Guiding Committee or GEBCO Officers meeting. Rear Admiral Andreassen said he would ask the Capitán if he was able to participate in future meetings. In the event that he decided to relinquish his GEBCO connections, an invitation to fill the vacancy would go out to all Hydrographic Offices.

A suggestion was aired that a rule be introduced such that non-attendance of a declared number of meetings automatically led to removal from the Committee. The Chairman said he was not in favour of such a proposal.

3.2 SUB-COMMITTEE ON DIGITAL BATHYMETRY (SCDB)

The Chairman noted that, in February 1996, Mr. Norman Cherkis was invited to become a full member of the SCDB.

3.3 SUB-COMMITTEE ON UNDERSEA FEATURE NAMES (SCUFN)

There were no suggested changes in membership.

4. MATTERS ARISING FROM THE SUMMARY REPORT OF THE FIFTEENTH SESSION OF THE JOINT IOC-IHO GEBCO GUIDING COMMITTEE, MONACO 15 - 17 MAY 1995 (DOC.IOC-IHO/GEBCO-XV/3)

All matters arising from this report were covered by items 4.1 and 4.2 below or other agenda items.

4.1

GRAVITY ANOMALIES FROM SATELLITE ALTIMETRY

Dr. Walter Smith reported that, as requested at the last meeting, the Chairman had written to important alteration to his planned schedule.

Dr. Michael Loughridge, speaking on behalf of NOAA, added that the US Navy had released previously classified GEOSAT data. As thanks for this, the Chief of Naval Operations was presented with a watch. declassification initiative introduced by the Chief of Naval Operations.

4.2 ITEM 7 (PARAGRAPHS 67-71) IBCEA SHEET 1.08

Mr. Peter Hunter said he regretted that, due to unforeseen work demands arising from the transfer of offices to Southampton, he had been unable to meet the requirements set out in the minutes to recompile the area where canyons were thought to cross the margin. The Chairman expressed concern that this work was still outstanding. Mr. Michel Huet said that SHOM were holding up the final printing of sheets 1.06 and 1.09 pending the resolution of the concerns raised by GEBCO over Sheet 1.08 - it was agreed that this problem should be resolved without delay. Mr. Peter Hunter agreed to provide the necessary compilation within a short period.

5. SUB-COMMITTEE ON UNDERSEA FEATURE NAMES

5.1 VERBAL REPORT ON INTERSESSIONAL ACTIVITIES 1995-1996

Mr. Michel Huet, Secretary of the Sub-Committee, reported that the 130 names approved at the Eleventh Meeting, Monaco, 1995, had been entered in the digital Gazetteer. In addition, IHB also reviewed their archives on undersea features and extracted historical details for these names.

Since the last meeting, 30 new names had been examined, three of which have been approved. The *Sohm Abbysal Plain* was correctly re-named as *Suhm Abbysal Plain* after advice provided by the oceanographic library at the Musée de Monaco.

He added that agreement had been reached between SCUFN and ACUF on the proposal to name a seamount group at the north-east end of the Guinea Rise (9°04 N, 20°20 W to 8°58 N, 19°52 W) as the Grimaldi Seamounts after the Monegasque ruling family. Additionally, two others in the group *Hirondelle* and *Princesse Alice* were to be named after the two research ships of Prince Albert I. He expected that Prince Rainier would signal his approval to coincide with the 500th anniversary of the Grimaldi family.

He said a new edition of the Gazetteer is almost completed and will be ready for the next edition of the GDA. The Gazetteer will be produced on diskette (1 or 2) and will include software to extract names for use in a folder - or printed as a book.

Mr. Michel Huet said that when using the Gazetteer information, in conjunction with the GDA, interrogation will supply not only the name and position but will include historical information, where listed.

5.2 DISCUSSION ON UNDERSEA FEATURE NAMES AND ACTIVITIES

The Chairman raised the issue of the standardisation of generic names and asked what progress had been made since the discussion at the last Session of the Guiding Committee (Doc. IOC-IHO/GEBCO-XV/3).

Mr. Michel Huet replied that he had assisted Dr. Bob Fisher in undertaking a review of generic names in use by GEBCO, they had made some small but useful corrections. It is expected that these will be included by the WG on the Hydrographic Dictionary. One key feature was the agreed classification of seamount or guyot as requiring an elevation from the sea floor of at least 1000m. Mr. Michel Huet promised to provide a correction page listing the revised definitions for the new edition of the GDA.

Rear Admiral Andreasen said that the IHB were anxious to standardise their Gazetteer, and although they knew of commercial Gazetteers with bibliographic systems-software he was doubtful if there were commercial packages available to deal with the specific task in hand. He added that it was the wish of the IHB to put the Gazetteer on the Internet, free of charge.

The Chairman raised a question about the Draft Terms of Reference proposed by the ICA Working Group on Marine Cartography which included a number of issues, such as naming of undersea features, in conflict with GEBCO. In response, Rear Admiral Andreasen said that the IHB had objected to the conflicts, but as yet had no reply from Mr. Ron Furness.

5.3 LIAISON AND CO-OPERATION WITH THE US BOARD ON GEOGRAPHIC NAMES/ADVISORY COMMITTEE ON UNDERSEA FEATURES (BGN/ACUF)

Mr. Norman Cherkis reported that seamount names Lombardi, Carron and Rankin had been re-allocated, within the ACUF data base. This permitted the features, formerly identified by those names, to be renamed by SCUFN as part of the Grimaldi Seamounts.

He added that positions recognized at the 1995 meeting of GEBCO-SCUFN for three seamounts, *Prince Albert*, *Hirondelle* and *Princess Alice* were accepted and approved by USBGN-ACUF. A fourth,

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individual seamount is located in the cluster at position 8°49.0 N. 20°04.0 W, with a least depth of 1375 (uncorrected) meters, and a vertical relief of approximately 1040 meters. All four of the seamounts appear to be situated on a single pedestal, with a common base depth of approximately 3650 (uncorrected) metres. This seamount group will be given the name of Grimaldi Seamount in BGN/ACUF gazetteer files. The fourth seamount in the Grimaldi Seamounts group will not be named at present, but reserved for future naming of a member of the Monegasque royal family, at a time of International Hydrographic Bureau choosing.

6. SUB-COMMITTEE ON DIGITAL BATHYMETRY, THIRTEENTH MEETING, EAST-WEST CENTER, HAWAII, 30 APRIL - 2 MAY 1996

Dr. Meirion T. Jones, Chairman, Sub-Committee on Digital Bathymetry (SCDB), introduced this item and presented the report of the Thirteenth Meeting of his Sub-Committee (to be issued as Doc. IOC-IHO/GEBCO SCDB-XIII/3), which was held during the previous three days at the East-West Center, Hawaii. Experts from 9 countries participated in the meeting. The Sub-Committee was grateful for the contribution made by colleagues in the Hawaiian Institute of Geophysics and for the demonstrations of their activities.

Progress was reported on a wide range of national and international efforts in the field of Bathymetric mapping; management of echo-sounding data; standards and guidelines for the management and exchange of digital bathymetric data; and the future development of the GDA (more details will appear in Doc. IOC-IHO GEBCO SCDB-XIII/3).

6.1 OCEAN MAPPING AND ASSOCIATED ACTIVITIES

Arctic Ocean

IOC mission to Moscow and St Petersburg January 1996 (Jones) initiative to widen support for GEBCO - Report expected by July 1996.

US Naval Research Laboratory (NRL) (Cherkis) - new bathymetric map of Franz Josef Land Area was published in October 1995. Data continues to be collected in the Barents and Kara Seas. The bathymetric map is in digital form.

Seafloor Atlas of the Northern Norwegian Sea, NR137, has been published. The Atlas contains bathymetry, geophysics and side-scan imagery of the region.

Bathymetry of the high Arctic, collected under ice, is about to be released.

Alfred-Wegener-Institut (AWI), Bremerhaven, Germany (Schenke) - Chart of Fram Strait, scale 1: 100,000, is almost completed. Work continues on the central Arctic Ocean and Aegir Ridge.

Atlantic Ocean

UK Southampton Oceanography Centre (Hunter) - North-east Atlantic contours being compiled north of 60°N and west of 0°. SOC is assisting Dr. Sibuet, IFREMER, with his bathymetric compilation in two areas: (1) north of 48°N and W of 22°W and (2) south of 32°N.

IOC International Bathymetric Chart of the Central Eastern Atlantic (IBCEA) [Jones (for SHOM)] Proof copies of sheets 1.06 and 1.09 were circulated in June 1995 - printing of both deferred awaiting review of comments from Sharman. Portugal expect to circulate copies of Sheet 1.01 for comment in 1996. Spain will undertake production of Sheets 1.04 and 1.05 - no schedules have been provided.

Circum-Atlantic Project (CAP) (Cherkis) - following upheaval in USGS no further information has been received about this project.

IFREMER (Hunter) - EEZ mapping project underway, the planned series extends from 32°N-50°N; 0°-31 °W. Dr. Sibuet has provided the first sheet of his bathymetry compilation for inclusion in GDA.

Mediterranean Sea

IOC International Bathymetric Chart of the Mediterranean and its Geological-Geophysical Series (IBCM) [Jones (for Hall)] - preparations are in land to demonstrate new DTM presentation techniques (Sheet 10) at next IBCM meeting, September/October 1996.

Caribbean Sea

IOC International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA) [P. Hunter (for Frias)] - meetings held in Cuba and Venezuela, November 1995. Sheets 1.07 and 1.08 approved and ready for publication. Sheets 1.14 and 1.15 reviewed but further work required. Other sheets completed: 1.01, 1.05, 1.06. Sheets 1.02, 1.03 and 1.11 nearing completion.

Indian Ocean

USA Scripps Institution of Oceanography (SIO). [Weatherall (for Fisher)] - Fisher has continued his work of contouring the greater Indian Ocean, his maps are being prepared in collaboration with BODC, see Annex VI.

IOC International Bathymetric Chart of the Western Indian Ocean (IBCWIO) [Hunter (for Bettac)] . Training course on Bathymetric Charting opened on **R.V. METEOR** 17 December 1995. Ten trainees from East-Africa countries and two from Pakistan and India attended the course which ended at Cape Town, South Africa.

Pacific Ocean

IOC International Bathymetric Chart of the Western Pacific (IBCWP). (Hou) - Second meeting of IBCWP will take place in Australia, October/November 1996.

Organizing countries have been appointed for four of the six sub-regions, work is progressing in each. The first proofs of charts are scheduled for 1997.

South Pacific Applied Geoscience Commission (SOPAC) (Woodward). Since 1995, emphasis has been put more on digital distribution, management and storage of bathymetric data than production of new data sets. Commitment to process and handle multibeam data has been delayed due to limited staff resources.

Japan Hydrographic Department - (Tam) reported activities on a series of bathymetric maps and digitization of Ocean Plotting Sheets.

Korea Ocean Research and Development Institute (KORDI) (Suk) - by end of 1996, three new world-class research vessels will be added to its fleet, each equipped with a multibeam echo sounder.

New Zealand Oceanographic Institute (NZOI) (Hunter) - major project to revise New Zealand Region Bathymetry first published in 1980. Compiled at 1: 1,000,000 with contour intervals at 250 metres, the final publication scale will be 1:4,000,000. A working draft is expected to be completed by July 1996.

Servicio Hidrográfico y Oceanográfico de la Armada de Chile (Jones) - Sheets 365, 395 and 424 are completed. 364, 423, 453, and 508 will be subject to a full review before digitizing, Sheets 454 and 584 will be available soon.

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Hawaii Institute of Geophysics and Planetology:

- (i) (Keating) - Introduced two Atlases, Pacific Sea Floor Atlas and Hawaii Sea Floor Atlas.
- (ii) (Kronke) Presented his paper on Morphotectonic Interpretations of SOPACMAPS 1:500,000 charts, Central Solomon Islands - Southern Tuvalu.

Antarctic Waters

Alfred-Wegener-Institut (AWI), Bremerhaven, Germany (Schenke) - contouring and editing work for OPS areas 567, 553 (Southern Weddel Sea) is now complete. AWI will print 6 maps (OPS areas) and one general map at scale 1:2,000,000. New coastline in this region will be interpreted and digitized by AWI, data to be made available to GEBCO and the scientific community.

IHO Permanent Working Group for Co-operation in the Antarctic (Schenke) - March 1996 meeting approved the INT nautical charts scheme. A Regional Commission was established and the first examples of nautical charts were presented.

General (worldwide)

Bathymetry Workshop, Hamburg, August 1995 (Schenke) - successful initiative to provide protocol to address the deficits of data collection, documentation and archiving for German research vessels.

6.2 IHO DATA CENTRE FOR DIGITAL BATHYMETRY (DCDB)

Dr. Michael Loughridge reported that from May 1995 to February 1996, the National Geophysical Data Centre (NGDC) responded to 103 requests for data or information from 22 countries of which 21 are IHO Member States. Also in 1995: a total of 169 cruises/legs of data were assimilated into the global marine geophysical data base (GEODAS), including over 1.5 million soundings from 14 agencies located in 9 countries.

The 1.5 million soundings represent a nearly 5 percent increase in bathymetric data holdings at NGDC for 1995. In March 1996, the new GEODAS CD-ROM data set, version 3.2, was released containing data assimilated to the end of 1995. Version 3.2 now contains over 13.2 million nautical miles of bathymetry from 3778 cruises with 31.0 million digital records. GEODAS now consists of two distinct applications, GEODAS/TRKDAS for marine geophysical trackline data and GEODAS/HYDAS for hydrographic (bathymetric) survey data.

NGDC are considering extending their Internet accessions to include TRKDAS CD-ROM data.

6.3 GEBCO GUIDELINES PART 4. DIGITAL BATHYMETRIC DATA (MULTIBEAM ECHO-SOUNDERS)

Rear Admiral Andreasen said that a Draft Part 4, GEBCO Guidelines - Digital Bathymetric Data (Multibeam Echo-Sounders) was distributed to IHO Member States for comment (CL 37/95), 31 October 1995. The results have been generally favourable except for some reservations, mainly by the BSH, about paragraph 4.1.5 where they say the affects of motion need to be better defined. It was agreed that IHB should ask Dr. George Sharman to make the necessary changes and later discuss these informally with BSH. BODC would also be invited to look at the redraft before sending the final document to the IHO Members and interested commercial bodies.

Mr. Michel Huet pointed out that the Annex describing navigation requirements is also valid for Parts 3 and 4. Dr. Loughridge replied that NGDC would provide the necessary draft graphics to support these changes.

6.4 EXCHANGE FORMATS FOR BATHYMETRIC DATA

The Chairman SCDB reported that in February 1996 he had received a copy of the GSF format from Mr. Jim Ayres, DMA. It was suggested that GSF is better suited to describe the output of instruments rather than for data itself. However, whilst there seemed less concern about the choice of formats, there was full agreement on the need for the provision of good metadata.

Rear Admiral Andreasen said the IHO NSHC WG had studied the problem of exchange formats but after considerable deliberation were unable to find a resolution. The WG is likely to disband. Dr. Loughridge said it was probably best to abandon the idea of formats. Lamont-Doherty have a system that will read most formats.

Mr. Michel Huet added that the IHO were embarked on a study for the Exchange of Hydrographic Data for Surveys. It seemed a natural extension to develop an exchange format for multibeam data. He expected a conclusion to this study in 2-3 years.

The Chairman SCDB concluded the debate by saying he was interested in the IHO study but in the meantime would like to learn more of the Lamont-Doherty system.

6.5 FUTURE DEVELOPMENT OF GEBCO PRODUCTS

Gridded Data Set: The intersessional activities of the small teams, headed by Dr. Walter Smith, were reviewed. Presentations were given by Andrew Goodwillie, Peter Hunter, Bill Rankin and Gary Robinson. It was evident that after a long debate a consensus view was not yet possible. Several difficulties remained unresolved. These include: how to grid areas of topography? whether to use variable density grids? is replication of contours a desired goal? what should a gridded contour map be? how should the grid be updated?

Dr. Meirion T. Jones, Chairman SCDB, concluded the debate by asking for the gridding team to prepare a paper which reviews the problems of gridding and to follow this by compiling a small booklet, written from a GEBCO standpoint, which contains gridding solutions and instructions. He asked whether the team could produce strawman prototypes by September 1996 to be finalised in November at SOC, where members of the team will attend the SCOR WG 107 meeting.

7. THE GEBCO DIGITAL ATLAS

7.1 GEBCO GLOBAL NETWORK OF REVIEWERS (ANNEX IV) - APPOINTMENTS

Dr. Jones introduced a letter, dated 9 February 1996, received from Dr. José Corvalán of the Servicio Nacional de Geología y Minería, Chile. In this correspondence Dr. Corvalán stated that Lieutenant Patricio Carrasco, SHOA, is the designated GEBCO reviewer in his place.

It was noted that Lieutenant Carrasco, together with Dr. Corvalán, had been included on the 1995 Personality List as a reviewer of SE Pacific since July 1994. His permanent inclusion on the list was to have been the subject of a later discussion by the Guiding Committee in 1995, pending receipt of acceptable details about Lieutenant Carrasco's background. To date, no response has been forthcoming from Mr. Desmond Scott's letter to Captain Hugo Gorziglia dated 17 October 1994, asking for this information.

The Chairman said that the appointment of Reviewers of GEBCO could only be made as a decision of the Guiding Committee. Reviewers are appointed in a personal capacity which is determined on their expertise and wide appreciation of the scientific and hydrographic basis of bathymetry in their area of responsibility.

Mr. Peter Hunter commented that he had never received a reply from any of his correspondence to Dr. Corvalán. His letters addressed to Lieutenant Carrasco are answered by Capitán de Navío Sr. Hugo Gorziglia, Director, SHOA. He added that the quality of data from Chile is excellent.

It was agreed to delete the name of Dr. Corvalán from the GEBCO Personality List, as a Reviewer for the SE Pacific, and for the time being leave that of Lieutenant Carrasco in place. The Permanent Secretary said he would enquire further about obtaining the necessary details about Lieutenant Carrasco.

7.2 THE GEBCO REVIEWING SYSTEM

The Chairman said that the recent difficulties over the appointment of a suitable long term reviewer for the SE Pacific Region had served to highlight a much longer running problem about the Reviewing System in general. He asked whether GEBCO is satisfied about the functions of the reviewers? He continued by reading from para. 93 of Doc IOC-IHO/GEBCO-XV/3:

"It was considered that the essence of the role of the Reviewers is to advise the Guiding Committee, through the GBE, on the availability of new data in their areas of responsibility. They should act as an awareness network and should so far as possible be independent of the bathymetric generators. The GBE should plan with the Reviewers on an annual cycle, inviting them to report to him each year (to a deadline), drawing up a list of new material in their area that could be considered for incorporation into the GDA. They will then be able to report on the overall situation to either the Guiding Committee or the GEBCO Officers".

Note: The Roles of GEBCO Bathymetric Editor and the Reviewers are detailed in the GEBCO Guidelines. They are reproduced at Annex VII and VIII.

In his role as GEBCO Bathymetric Editor, Peter Hunter said he wrote to all the Reviewers on 1 February 1996; the responses so far are patchy with only 8 of the 19 reviewers replying.

The Chairman commented that what answers there were contained no recommendations for new material to be included in GDA. He agreed that Peter Hunter had asked all the right questions, and yet in terms of new data for the GDA, GEBCO were poorly informed - the system as it stood, fell a long way short of satisfactory.

Dr. Hans Schenke suggested that the experience of the PWGCA, in gathering such information, might be of some use. He proposed that the GBE prepare a standard form which both informs the Reviewers of data held by the GBE and specifically asks for information in other areas - he said this form of information exchange served to increase the interest level for both parties.

It was generally agreed that a more pro-active approach should be tried. Peter Hunter and Brian Harper were asked to design a pro-forma type letter on the lines of the PWGCA enquiry form. This should include provision for informing reviewers about other activities in their region or at the margins. Peter Hunter also suggested that he might include maps of altimetry data for each reviewer's area. Forms are to be sent to each reviewer at least 3 months prior to the next GEBCO meeting, thus allowing adequate time for a considered response.

The Chairman said that if these steps fail to provide an adequate service, GEBCO may have to consider abandoning the system.

7.3 THE GEBCO BATHYMETRIC EDITOR - ANNUAL REPORT

The 7-page Report of the Bathymetric Editor was discussed in at the prior meeting of the SCDB. For full details see Doc. IOC-IHO/GEBCO SCDB - XIII/3.

Mr. Peter Hunter reported that due to the move of his Institute from Wormley to the new Southampton Oceanography Centre (SOC), his involvement in editing the SOC Annual Report and other miscellaneous duties, he had insufficient time to devote to GEBCO matters. He added that the present

year's allocation for visits and other items was £5,000. This would make it difficult to carry out any extended visits as in previous years.

The Chairman said he was very concerned by these events, especially as the programme for visits by the GBE has also been severely curtailed in 1994-95. He said it was vital, at this stage of the GDA development, that the Editor was globally active.

Mr. Hunter replied that he had continued correspondence with a number of data contributors and reviewers and added that in the future he expected to be able to devote the bulk of his time to GDA activities.

Details of work prepared for the 1996 new edition of the GDA are at 7.8.

7.4 THE DIGITAL ATLAS MANAGER - ANNUAL REPORT

Ms. Pauline Weatherall submitted a report on her activities: Report of the GEBCO Digital Atlas Manager April 1995 - April 1996, see Annex III. Her main task had been the continuing co-operation with Dr. Robert L. Fisher (SIO) over digitizing his major work in the Greater Indian Ocean area. A further 80 charts have been digitized this year with the bulk of the work carried out in the area 100°E- 140°E. She added that when the recently received batch of 30 charts have been digitized they will complete digital coverage from 31°S to Antarctica: 10°W to 140°E.

Digitization is about to commence at BODC of a chart of the Bay of Biscay supplied by Dr. Jean-Claude Sibuet of IFREMER. This chart is at a scale of 1:200,000 at 41°N and covers the area 42°N - 50°N; 16°W - 0°W.

7.5 AUTHORIZATION PROCEDURES FOR IDENTIFYING SUITABLE MATERIAL FOR FUTURE INCLUSION IN GDA

The Chairman opened the discussion by reviewing the procedures that are in place for the acceptance of new data into the GDA. These procedures are laid down in the Terms of Reference for the GEBCO Bathymetric Editor - section 1.5.1 of GEBCO Guidelines. Essentially the procedures for the search and adoption of new data are contained in paragraph 1-4, see Annex VII.

He registered his concern that the GBE may require some protection in the event of map rejection. He said that the final authorization should rest at the level of the GEBCO Guiding Committee or GEBCO Officers, not with the GBE.

Dr. Meirion T. Jones said it is necessary to demonstrate to the world's scientific community that we have a peer review procedure in place and that GEBCO retains the option to exclude maps which do not receive their seal of approval. Dr. Hans Schenke added his agreement that these data should be seen as scientific works, and as such, subject to internal and external refereeing.

The meeting recognised that maps available for the GDA ranged from those which had passed rigorous refereeing procedures to one-man compilations having no external examination. It was agreed that where the GBE was not satisfied with the authorship and stated peer review procedure, for any data, he should undertake to refer the data to the Guiding Committee for their examination. The process of examination and approval would require presentation of same-scale data including: track control, existing GDA contours, satellite radar altimetry and any overlapping data of recent origin. Manual operations, using light frames, was the recommended method of data comparison.

The use of raster scanning as a tool to assist in map comparisons was noted.

7.6 CONTOUR GENERALISATION

The Chairman asked the GBE how he intended to stitch in new authorised maps into the GDA especially those that had originally been compiled at a larger scale than the 1: 10M GEBCO maps, and which contained additional sub-divisional contours.

Mr. Peter Hunter, GBE, replied that new maps would be accepted for inclusion to the GDA as they were presented. Any edge matching routines required would be made to the GDA contours. He added that where new maps carried additional contours, these would terminate at the map edge.

The Chairman asked how the contours, on a map chosen for inclusion into the GDA, could be incorporated when the divisions between the 1000 metre contours were 200, 400, 600 and 800 metres rather than the 100-900 metres or 500 metres convention used throughout the GEBCO. After some debate it was agreed that in such cases the 500 metre contour would have to be added to the new map, preferably by the original compiler, before it could be incorporated in the GDA. The Chairman said the 500 metre division was essential to preserve uniformity, the 2,500 metre contour was also of prime interest to the UNCLOS investigations.

The Chairman then enquired how the GDA, which comprised a range of data sets, each with different contours and detail resolutions, could be used to produce a printed revision of the 6th Edition of the GEBCO. He recognised two conflicting requirements: firstly, the need to preserve large scale map details such as depictions of canyons; and secondly, to produce a homogeneous GEBCO printed edition which depicted a regular set of contours in the same manner of the current 5th Edition series. He asked whether a sub-set generalisation of the GDA could be produced to provide a data set from which to print the 6th Edition.

Dr. Walter Smith replied that since there are no plans to produce the 6th Edition before the year 2000, GEBCO can afford to await the outcome of current research on techniques to reduce line detail, automatic simplification routines, and gridding applications.

Rear Admiral Andreassen added that because of the rapid changes taking place in Print on Demand technology, it may prove advantageous to develop the GDA to provide a print option via a large format plotter rather than go to the expense of printing thousands of hard copy sheets. The Chairman said this was a subject for debate at the next session of the Guiding Committee meeting.

7.7 CONTINENTAL MARGIN DATA

The Chairman said he was aware of an increasing number of maps of continental margin areas generated by several organizations. These maps, many in digital form, were often detailed and included depth contours at 10 metre or 20 metre intervals. He asked whether GEBCO should consider including such maps into the GDA.

In a protracted debate that followed, the future needs of scientists were discussed. Their known requirements to model ocean currents, tidal regimes, and to study the environmental needs of coastal margin managements were considered against the hitherto accepted model of the GEBCO as manifested in the printed 5th Edition and the GDA. The specifications for GEBCO (403.F) state that: "*At the discretion of the scientific co-ordinator large areas of sea floor, shallower than 200 metres, may be represented by contours spaced at not less than 50-metre depth intervals*".

It was agreed that the advent of the GDA had opened the simple possibility of incorporating any new data sets irrespective of past constraints. The NRL Persian Gulf data set was cited as such an example. The Chairman concluded by saying he recognized the difficulties that were posed and the potential conflicts that might arise over the role of GEBCO as a data provider. He proposed that GEBCO await the findings of the SCOR WG 107 in which the needs of the scientific community will be clearly stated; these are not likely to be published before 1998. In the interim he said that the GBE should not accept any high resolution continental margin data for the next edition (1996) of the GDA.

Details of the SCOR WG 107 are in item 9.

7.8 MATERIAL FOR UPDATING THE GDA

Mr. Peter Hunter, GEBCO Bathymetric Editor (GBE), introduced a diagram (see Annex V) which showed the limits of maps and data sets that would be suitable for updating the GDA, subject, where necessary, to authorization by the Guiding Committee. The items for inclusion in the GDA were prioritised as follows:

- (i) **Indian Ocean:** Dr. Robert Fisher's bathymetric contour and trackline control charts - 31 °S - Antarctica: 10°W - 136°E. Dr. Fisher has agreed that this block of charts can be released for inclusion in the next edition of the GDA (1996), the second block, extending northwards to 28°N, will be released for publication in the subsequent edition of the GDA in late 1997. It was suggested that in the overlap area 65°S - 5°E, the AWI Weddell Sea maps compiled from recent multibeam data, should be accepted. The Chairman said the authorization procedure for acceptance of Dr. Fisher's charts, would consider this point and the overlap with Sheet 5.12. The meeting agreed that Dr. Fisher's charts were a most significant and welcome contribution to the GEBCO.
- (ii) **Weddell Sea:** AWI contour chart - 65°S - 78°30'S; 61°W - 5°E. Dr. Meirion T. Jones said that AWI were about to digitize a new coastline (SCAR/BAS) of the Antarctic Peninsula to replace the WVS version. He suggested that if timing difficulties arose over this change he would limit the capture of data of the western edge of the map to 58°W.
- (iii) **NE Atlantic Ocean:** Institute of Oceanographic Science's Bathymetry of the Northeast Atlantic, (IOS BNEA), Sheets 1 and 2 -scale 1:2,400 000. These two published sheets were accepted as candidates together with other larger scale data sets in the area:
 - Charlie Gibbs Fracture Zone:
51°30'N - 53°N; 36°W - 29°W - scale 1:250,000
 - King's Trough :
42° - 45°N; 25°W - 19°W - scale 1:500,000 at 46°N
 - Madeira Abyssal Plain:
26°N - 34°N; 28°W - 21°W - scale 1:100,000 at 33°N

Digital Data sets:

- Rockall Plateau 54°N - 60°N; 24° - 15°W
- Rockall Bank: 58° 13'N - 56°N; 15°50'W - 13°W
- Madeira Area: 31°N - 33°N; 18°W - 14°W

Items identified as suitable for inclusion in the 1997 edition of the GDA included: the Northern Part of Dr. Robert Fisher's Indian Ocean project; Hawaiian Regional Maps by Barbara Keating; Franz Josef Land Area, Matishov, Cherkis et al; IOS maps of the Canaries and Maderia and Dr. Sibuet's Bay of Biscay Chart. Mr. Peter Hunter, GBE, was encouraged to seek other suitable maps and make recommendations to the Guiding Committee.

7.9 DISTRIBUTION/SALES OF GEBCO DIGITAL ATLAS (GDA)

Dr. Meirion T. Jones presented details of the distribution and sales of the GDA since its publication 1994 - see Annex VI. He said that promotional material for the Atlas has been sent to 50,000 addresses worldwide. New initiatives for introducing the Atlas to a wider community were awaiting publication of the first new edition planned for the Autumn of 1996.

8. THE INTERNATIONAL YEAR OF THE OCEAN (1998)

The Permanent Secretary reported that he had received information covering the EXPO 98 exhibition to be held in Lisbon. The theme of the exhibition *The Oceans. A Heritage for the Future* was chosen by the Portuguese who also took the initiative to name 1998 as *The International Year of the Ocean*. The Scientific Advisor for the Lisbon World Exposition is: Professor Mário Ruivo, Chairman, National UNESCO Commission, Portugal.

The prospect of some involvement by GEBCO was discussed. It was agreed that any exhibit provided by GEBCO would require to stand alone, i.e. electronic displays, such as selected parts of GDA or fly throughs of three dimensional mapping, would have to be provided on a continuous loop basis.

The Permanent Secretary was requested to make further enquiries about the possibility of GEBCO's involvement in EXPO 98.

9. SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH (SCOR) WORKING GROUP 107 - IMPROVED GLOBAL BATHYMETRY

The Chairman reported that at its meeting in late 1995, the Executive Committee of the Scientific Committee on Oceanic Research (SCOR) decided to establish a new Working Group (WG 107) on the topic of Improved Global Bathymetry. WG 107 will be Chaired by Dr. Colin Summerhayes, Southampton Oceanography Centre (SOC), UK. The first meeting will be held at SOC in November 1996. Nine of the seventeen members of the Working Group are actual members of the GEBCO community.

It was proposed that SCOR should erect a working group to provide guidance for the solution of the new and critical problem that has been thrown up recently, in particular by the rapidly growing demands of ocean modellers, which itself is a response to rapid growth in the technology of computing, and also by the mismatch between the growing body of high resolution satellite altimetric data, which tell us one thing about the shape of the ocean floor, and conventional bathymetric data which in poorly surveyed areas tell us another.

SCOR recognized a pressing scientific need, and a longer term economic case, for improving knowledge of the topography of the sea bed. An improved digital bathymetry database is a requirement for the global ocean and continental shelves, but a real resolution and vertical accuracies are not yet defined. It seems likely that priority areas for bathymetric surveys could be identified from ocean modelling sensitivity tests.

Terms of Reference:

- to establish the scientific needs for improved ocean bathymetry,
- to determine the specifications for accuracy and resolution in different areas,
- to recommend actions and priorities.

The Chairman concluded by saying that the findings of the SCOR WG 107 will have a profound impact on the requirements for ocean mapping information in terms of detail, accuracy and area covered. GEBCO would follow the deliberations of WG 107 with interest.

10. JOINT IOC/IHO EDITORIAL BOARD - SCIENCE AND TECHNOLOGY BASIS FOR CONTINENTAL SHELF DEFINITION UNDER UNCLOS

The Chairman reported that he had received a letter from Mr. Dmitri Travin, IOC, dated 28 February 1996, which included a Draft Summary Report of the First Session of the Joint IOC-IHO Editorial Board for the Preparation of a Manual on Science and Technology Associated with the Definition of the Continental Shelf Under the United Nations Convention on the Law of the Sea, held at UNESCO, Paris, 31 January-2 February 1996. The single purpose of the meeting was to discuss the preparation of

a synthesis on Science and Technology associated with the definition of the Continental Shelf under the United Nations Convention on the Law of the Sea. The report was sent for information purposes only.

He added that although GEBCO was not actively involved in this work some members of the GEBCO community may be invited to contribute in their areas of expertise.

11. DATES AND PLACES FOR THE SIXTEENTH SESSION OF THE JOINT GUIDING COMMITTEE, THE ELEVENTH MEETING OF THE GEBCO OFFICERS, TOGETHER WITH MEETINGS OF THE SUB-COMMITTEES

11.1 1997 MEETINGS

The Chairman reported that the Sixteenth Session of the Guiding Committee will be held at the Southampton Oceanography Centre, 23-25 June 1997.

The SCDB and SCUFN Sub-Committees will meet in the preceding week at the Hydrographic Office, Taunton, on the following days:

SCDB-XIV	17 (12 noon) - 21 June
SCUFN-XII	17 - 20 June

Dr. Meirion T. Jones, Chairman, SCDB, said he hoped that by careful scheduling agenda items and workshop discussions it might be possible to accommodate those participants who had a need to attend the key debates of both meetings.

11.2 1998 MEETINGS

A number of suitable venues for GEBCO Officers XI and SCDB-XV meetings were considered. It was suggested that it would be desirable to hold them in the Southern Hemisphere, preferably in the Pacific Region. The meeting concluded that Australia was the most suitable venue for this occasion. It was agreed that, if possible, SCDB-XV should be held at the Australian Geological Survey Organization (AGSO), Canberra, and the Officers Session at the Office of the Royal Australian Hydrographic Service, Woolagong, preferably in March or April. Dr. Hans Schenke said he would make an overture to the Australian Geological Survey Organization. Rear Admiral Andreasen offered to approach the Royal Australian Hydrographic Service.

12. ANY OTHER BUSINESS

12.1 PROPOSED PUBLICATION OF THE RUSSIAN MARINE ATLAS

The Chairman reported that he had received a copy of a letter from Mr. Dmitri Travin, IOC, dated 15 July 1995 which was addressed to: All Members of the CGOM and All Members of the Guiding Committee for Ocean Mapping. The draft model which accompanied the brief letter of introduction described the proposed Atlas and included the suggestion that . . . *"Vol I - Bathymetry - could be created as a new edition of GEBCO. Besides, it could be printed not only as a book, but also on the same sheets as GEBCO 5th edition".* . .

It transpired that information about this proposed Atlas had reached the ears of some in the GEBCO community but had initially eluded those of Mr. Desmond P.D. Scott, Chairman, CGOM. His response to the IOC dated 15 September 1995 did not comment on the proposal but sought instead to ensure that the correct procedures for its consideration were properly conducted. He said any formal proposal from HDNO would have to be directed firstly to the Guiding Committee of GEBCO and subsequently considered by the IOC Assembly.

Speaking for the IHO, Rear Admiral Andreassen said that they had discouraged this proposal. Previously, Dr. Bob Fisher and Mr. Norman Cherkis had also raised their objections. The meeting agreed that GEBCO should not be involved with the proposed Atlas.

12.2 ARCHIVING GRIDS

Dr. Michael Loughridge commented that there are now several major grids available to the scientific community including Terrain Base , a collection of grids with DBDB-V as the marine content. NGDC was considering archiving such grids.

12.3 IOC ASSEMBLY OF JUNE 1995 - RESOLUTION XVIII-10

The Chairman reported that at the IOC Assembly of June 1995 Resolution XVIII-10 was adopted to support the Joint IOC-IHO Ocean Mapping Programme. The Resolution is reproduced as Annex IX. The GEBCO community welcomed this initiative.

He added that this is an attempt to begin to identify where high quality data to support scientific studies and predictions is needed and how it can be obtained. The philosophy behind this resolution runs parallel with the thoughts which prompted the formulation of SCOR WG 107. He commented that perhaps GEBCO has been a somewhat re-active organization in the past but needs to be more pro-active in data capture in the future.

13. CLOSURE OF THE MEETING

The Chairman closed the Session at 1700 on Friday 3 May 1995. He thanked all participants for their contribution to the debates and concluded by saying how invaluable he had found attendance at the SCDB Meeting where many of the items, raised in the Officers Meeting, are discussed from a more detailed technical standpoint. The inter-linking of these two meetings had proved most successful.

ANNEX I

1. OPENING OF THE SESSION

2. CONDUCT OF THE SESSION

2.1 ADOPTION OF THE AGENDA

2.2 DOCUMENTATION; ADMINISTRATIVE ARRANGEMENTS; ETC.

3. COMPOSITION OF THE GUIDING COMMITTEE AND ITS SUB-COMMITTEES

3.1 GUIDING COMMITTEE

3.2 SUB-COMMITTEE ON DIGITAL BATHYMETRY (SCDB)

3.3 SUB-COMMITTEE ON UNDERSEA FEATURE NAMES (SCUFN)

4. MATTERS ARISING FROM THE SUMMARY REPORT OF THE FIFTEENTH SESSION OF THE JOINT IOC-IHO GEBCO GUIDING COMMITTEE, MONACO, 15-17 MAY 1995 (DOC.IOC-IHO/GEBCO-XV/3)

4.1 ITEM 16.4 - PREPARATION OF GLOBAL COVERAGE OF SHEETS OF CONTOURED GRAVITY ANOMALIES FROM SATELLITE ALTIMETRY

4.2 ITEM 7 (PARAGRAPHS 67-71) - IBCEA SHEET 1.08

5. SUB-COMMITTEE ON UNDERSEA FEATURE NAMES

5.1 VERBAL REPORT ON INTERSESSIONAL ACTIVITIES 1995- 1996

5.2 DISCUSSION ON UNDERSEA FEATURE NAMES AND ACTIVITIES

5.3 LIAISON AND CO-OPERATION WITH THE US BOARD ON GEOGRAPHIC NAMES/ADVISORY COMMITTEE ON UNDERSEA FEATURES (BGN/ACUF)

6. SUB-COMMITTEE ON DIGITAL BATHYMETRY, THIRTEENTH MEETING, EAST-WEST CENTER, HONOLULU, 30 APRIL - 2 MAY 1996

6.1 OCEAN MAPPING AND ASSOCIATED ACTIVITIES

6.2 IHO DATA CENTRE FOR DIGITAL BATHYMETRY (IHO-DCDB), BOULDER

6.3 GEBCO GUIDELINES PART 4. DIGITAL BATHYMETRIC DATA (MULTIBEAM ECHO-SOUNDERS)

6.4 EXCHANGE FORMATS FOR BATHYMETRIC DATA

6.5 FUTURE DEVELOPMENT OF GEBCO PRODUCTS

7. GEBCO DIGITAL ATLAS (GDA)

7.1 GEBCO GLOBAL NETWORK OF REVIEWERS (Annex IV) - APPOINTMENTS

7.2 THE GEBCO REVIEWING SYSTEM

IOC-IHO/GEBCO Officers-X/3

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- 7.3 THE GEBCO BATHYMETRIC EDITOR - ANNUAL REPORT
- 7.4 THE GEBCO DIGITAL ATLAS MANAGER - ANNUAL REPORT
- 7.5 AUTHORISATION PROCEDURES FOR IDENTIFYING SUITABLE MATERIAL FOR FUTURE INCLUSION IN GDA
- 7.6 CONTOUR GENERALISATION
- 7.7 CONTINENTAL MARGIN DATA
- 7.8 MATERIAL FOR UPDATING THE GDA
- 7.9 DISTRIBUTION/SALES OF GEBCO DIGITAL ATLAS (GDA)
- 8. THE INTERNATIONAL YEAR OF THE OCEAN (1998)**
- 9. SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH (SCOR) WORKING GROUP 107-IMPROVED GLOBAL BATHYMETRY**
- 10. JOINT IOC/IHO EDITORIAL BOARD - SCIENCE AND TECHNOLOGY BASIS FOR CONTINENTAL SHELF DEFINITION UNDER UNCLOS**
- 11. DATES AND PLACES FOR THE SIXTEENTH SESSION OF THE JOINT GUIDING COMMITTEE, THE ELEVENTH MEETING OF THE GEBCO OFFICERS, TOGETHER WITH MEETINGS OF THE SUB-COMMITTEES**
 - 11.1 1997 MEETINGS
 - 11.2 1998 MEETINGS
- 12. ANY OTHER BUSINESS**
 - 12.1 PROPOSED PUBLICATION OF THE RUSSIAN MARINE ATLAS
 - 12.2 ARCHIVING GRIDS
 - 12.3 IOC ASSEMBLY OF JUNE 1995 - RESOLUTION XVIII-10
- 13. CLOSURE OF THE MEETING**

ANNEX II

LIST OF DOCUMENTS¹

IOC-IHO/GEBCO Officers-X/ 1 prov	Provisional Agenda
IOC-IHO/GEBCO Officers-X/2	Annotated Provisional Agenda
IOC-IHO/GEBCO Officers-X/3	Summary Report of the Session
IOC-IHO/GEBCO Officers-X/4	List of Documents
IOC-IHO/GEBCO Officers-X/5	Report of the GEBCO Bathymetric Editor
IOC-IHO/GEBCO Officers-X/6	Report of the GEBCO Digital Atlas Manager 1994-95
IOC-IHO/GEBCO Officers-X/7	GEBCO Digital Atlas - Promotion, Sales and Servicing
IOC-IHO/GEBCO Officers-X/8	Resolution XVIII- 10 adopted by the Consultative Group on Ocean Mapping to the eighteenth session of the IOC Assembly, 13-27 June 1995
IOC-IHO/GEBCO-XV/3 (in English and French)	Summary Report of the fifteenth session of the GEBCO Guiding Committee, IHB Monaco, 15-17 May 1995.
IOC-IHO/GEBCO SCDB-XII/3	Summary Report of the twelfth meeting of the GEBCO Sub-Committee on Digital Bathymetry, SACLANT, La Spezia, Italy, 9-12 May 1995
IOC-IHO/GEBCO SCUFN-XI/3	Summary Report of the eleventh meeting of the GEBCO Sub-Committee on Underwater Feature Names, IHB Monaco, 11-13 May 1995
IOC/INF-988	Report of the Consultative Group on Ocean Mapping (CGOM) to the Eighteenth Session of the IOC Assembly, 15 May 1995
B-7	Guidelines for the GEBCO (excepting Part 4)
GEBCO Personality List	Revised 1 April 1996

¹ For reference only. Only stocks of Summary Reports of Sessions and Meetings are maintained.

ANNEX III

REPORT OF THE GEBCO DIGITAL ATLAS MANAGER APRIL 1995 - APRIL 1996

Indian Ocean/Southern Ocean Area Bathymetry Data

Work has continued on the digitisation of Dr. Robert Fisher's bathymetric contour and trackline control charts. A further 80 charts have been digitised this year, with the majority of the work being done in the area 100°E - 140°E. BODC has recently received 30 charts from Dr. Fisher. Once digitised, this new material will complete the coverage of the digital data set from 31°S to Antarctica; 10°W to 140°E, i.e., the area to be included in the next release of the GDA - see attached diagrams.

Quality control work, (checking for labelling and registration errors), has also been carried out on 107 charts in the area 80°E-140°E; 23°N-71 °S.

Further quality control work is needed on 36 charts in the area 31 °S - Antarctica: 10°W 140°E.

BODC has also received the digital bathymetric contour and trackline control data from Dr. Fisher's colleagues at Scripps Institution of Oceanography for the area 10°W to 20°E; 30°S to Antarctica. The majority of this data has now been incorporated with that held at BODC.

Revisions to the existing bathymetry for the area 59°S - 71°S; 10°W - 40°E, (due to the receipt of new data from Polarstern cruises 1988 - 91) were also received from Dr. Fisher - this new material has now been incorporated into the existing data set.

Plots of the bathymetric contour and trackline control data for the area 31 °S - 71 °S; 60°E 136°E were produced for display at the meeting of the American Geophysical Union in San Francisco during December 1995.

Northeast Atlantic Bathymetry Data

Update material has also been received for the Northeast Atlantic Area.

The majority of the update material is taken from the Institute of Oceanographic Sciences Bathymetry of the Northeast Atlantic, (IOS BNEA), sheets 1 and 2, (scale : 1:2,400,000 at 41°N), with the following additional charts and digital data sets provided by Mr. Peter Hunter.

1. Charlie Gibbs Fracture Zone: (51°30'N - 53°N; 36°W - 29°W - scale 1:250,000)
2. King's Trough (42°N - 45°N; 25°W. 19°W - scale 1:500,000 at 46°N)
3. Madeira Abyssal Plain : (26°N - 34°N; 28°W - 21°W - scale 1:000,000 at 33°N)

(The above charts have now been digitised)

Digital Data sets received:

Rockall Plateau : (54°N - 60°N; 24°W - 15°W)

Rockall Bank : (58°13'N - 56°N; 15°50'W - 13°W)

Madeira Area : (31°N - 33°N; 18°W - 14°W)

A chart of the Bay of Biscay region has also been supplied by Dr. Jean-Claude Sibuet of IFREMER. This chart is at a scale of 1:1,200,000 at 41°N and covers the area 42°N-50°N; 16°W - 0°. The chart has now been raster scanned and will be digitised at BODC.

Trackline control for the IOS BNEA has been taken from the original 1:1,000,000 scale compilation sheets. To date, data has been digitised from 11 of the 13 charts which cover this area.

IOC-IHO/GEBCO **Officers-X/3**

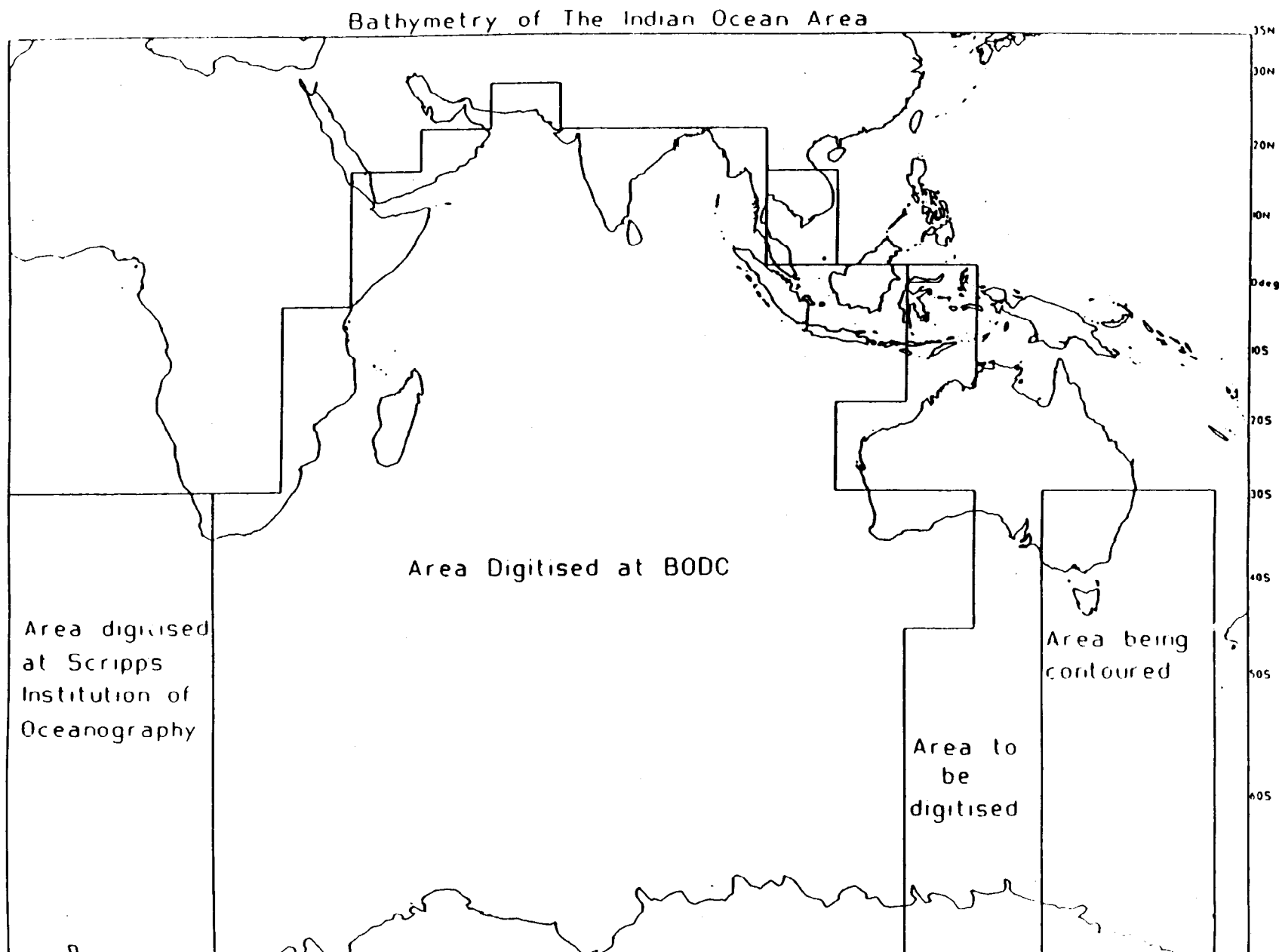
Annex III - page 2

Quality control checks for labelling errors have been carried out on the IOS BNEA digital bathymetry data set. Due to the time involved, further quality control checks for digitisation errors will be carried out on the delivery of a DEC Alpha station in May.

Additional Data Sets Received

New data sets were also received from:

1. Norman Cherkis for the Franz Josef Land Area
2. Hans Werner Schenke, AWI - Weddell Sea area.

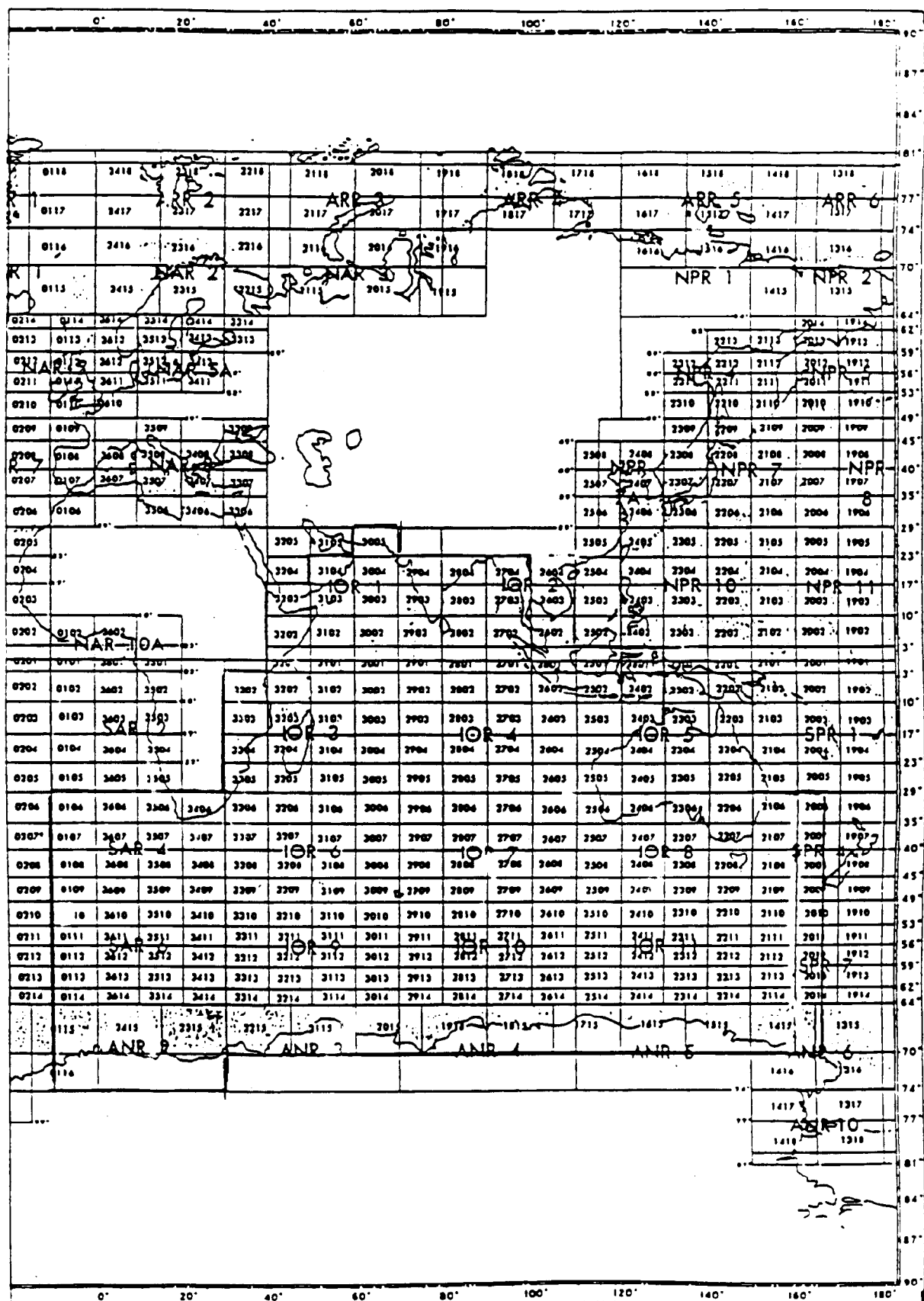


Status of the Bathymetric Chart of the Indian Ocean Being Contoured
by Dr. R. L. Fisher at Scripps Institution of Oceanography
May 1996

IOC-IHO/GEBCO Officers-X/3

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Index to the 4 inches to 1 degree of longitude scale charts used by Dr. Fisher in
Compiling his Bathymetric chart of the Indian Ocean Area



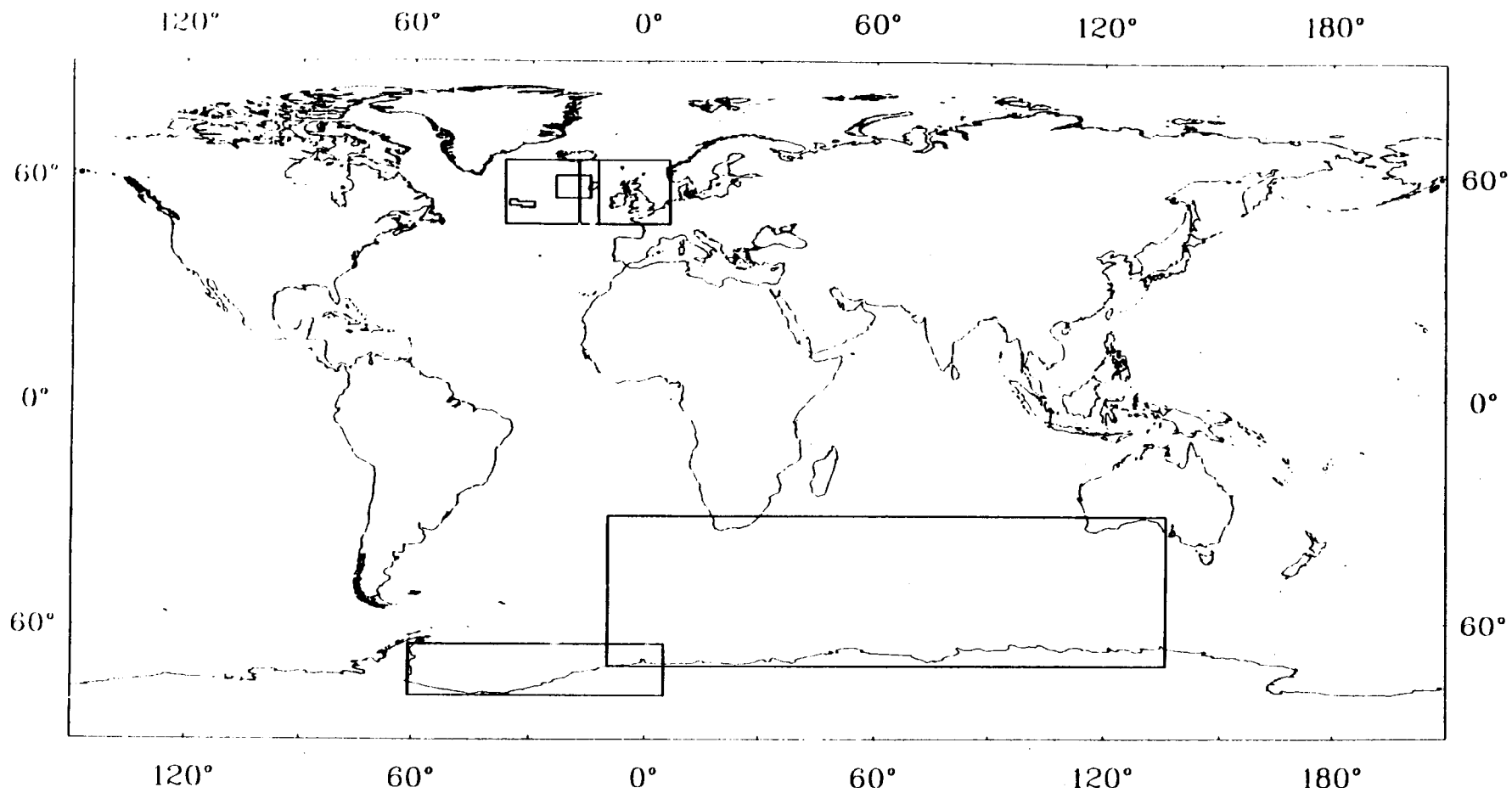
ANNEX IV

LIST OF REVIEWERS

Antarctic Waters south of 46°40 S	Hans-Werner Schenke	Accepted
North Atlantic Ocean (excluding Caribbean Sea & Gulf of Mexico)	Peter Hunter David Monahan (link to Galina Agapova for area 0°-7°N)	Accepted Accepted
Caribbean Sea & Gulf of Mexico	Troy Holcombe	Accepted
Mediterranean & Black Seas	John K Hall Andrey Popov	Accepted Accepted
Arctic Ocean	David Monahan Evgeniy Shchaulov	Accepted Accepted
South Atlantic Ocean	Norman Z Cherkis (link to Brazilians, also Robert L Fisher)	Accepted
Indian Ocean	Robert L Fisher	Accepted
North-west Pacific Ocean	Gleb B Udinstev Alexander Svarichevskiy	Accepted Accepted
Central west Pacific Ocean	Kunio Yashima	Accepted
South-west Pacific Ocean	Alfred Simpson	Accepted
North-east Pacific Ocean	George Sharman	Accepted
Central east Pacific Ocean	Juan Garcia Abdeslem Luis Delgado Argote	Accepted Accepted
South-east Pacific	Patricia Carrasco Hellwig	Nominated
New Zealand region	Ian Wright	Accepted

ANNEX V

AREAS FOR INCLUSION IN THE 1996 NEW EDITION OF GDA



ANNEX VI

DISTRIBUTION/SALES OF GEBCO DIGITAL ATLAS - SUMMARY STATISTICS (1 APRIL 1996)

(a)	Total number sold/distributed		615 copies
	Total number sold		442 copies
	Number of complementary copies		173 copies
(b)	Copies sold/distributed to 63 countries		
(c)	Breakdown of copies sold/distributed by sector:		
	Government bodies		266 copies
	University groups		183 copies
	Commercial bodies		110 copies
	Other organisations		56 copies
(d)	Distribution of 173 complementary copies:		
	GEBCO community		73 copies
	International exchange		49 copies
	UK national exchange		51 copies
(e)	Sales/distribution by month		
	Month	Copies sold	Gratis copies
			Total copies
	May 1994	17	18
	June 1994	33	52
	July 1994	20	3
	August 1994	8	9
	September 1994	21	7
	October 1994	16	1
	Nov. 1994	18	2
	December 1994	13	6
	January 1995	16	1
	February 1995	48	5
	March 1995	31	8
	April 1995	18	5
	May 1995	28	8
	June 1995	20	3
	July 1995	23	6
	August 1995	16	2
	Sept. 1995	18	4
	October 1995	15	3
	Nov. 1995	20	3
	December 1995	13	2
	January 1996	10	1
	February 1996	10	23
	March 1996	10	1
	Total:	442	173
			615
(f)	Number of recipients registering their copies with BODC = 322 i.e., 52%		

IOC-IHO/GEBCO-X/3

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DISTRIBUTION/SALES OF GEBCO DIGITAL ATLAS (1 APRIL 1996)

Country	Sector GOV	UNIV	Total COMM	Other	(sold)
Argentina	1	-	-	-	1 (0)
Australia	16	8	3	-	27 (24)
Austria	1	-	-	-	1 (1)
Belgium	1	3	1	2	7 (6)
Brazil	4	4	-	-	8 (7)
Bulgaria	1	-	-	-	1 (0)
Canada	14	8	3	2	27 (22)
Chile	2	-	-	-	2 (2)
China	2	-	-	-	2 (0)
Colombia	2	-	-	-	2 (0)
Cote d'Ivoire	2	-	-	-	2 (1)
Croatia	2	-	-	-	2 (1)
Cuba	1	-	-	-	1 (0)
Denmark	5	3	-	1	9 (7)
Ecuador	2	-	-	-	2 (0)
Egypt	1	-	-	-	1 (0)
Falkland Is.	1	-	1	-	2 (2)
Facros	2	-	1	-	2 (2)
Fiji	-	-	-	1	1 (0)
France	12	6	4	6	28 (19)
Germany	20	22	3	2	47 (45)
Greece	3	1	-	1	5 (3)
Guinea	1	-	-	-	1 (0)
Iceland	2	2	1	-	5 (5)
India	3	1	-	-	4 (2)
Iran	1	-	-	-	1 (0)
Ireland	1	1	-	-	1 (0)
Israel	1	1	-	-	2 (1)
Italy	5	5	-	6	16 (14)
Japan	6	7	16	1	30 (28)
Kenya	1	-	-	-	1 (0)
Korea	4	-	-	-	4 (2)
Malaysia	1	-	-	-	1 (0)
Malta	-	1	-	-	1 (1)
Mauritania	1	-	-	-	1 (0)
Mexico	1	-	-	-	1 (0)
Monaco	-	-	-	8	8 (6)
Netherlands	2	1	6	2	11 (10)
New Caledonia	-	-	1	1	1 (1)
New Zealand	2	1	2	1	6 (4)
Nigeria	1	-	-	-	1 (0)
Norway	10	2	4	2	18 (13)
Papua New Guinea	-	1	-	-	1 (0)
Peru	1	-	-	-	1 (1)
Philippines	-	-	-	1	1 (1)
Poland	1	-	-	-	1 (1)
Polynesia (French)	-	1	-	-	1 (1)
Portugal	1	1	-	-	2 (2)
Russia	16	1	-	1	18 (1)
Singapore	1	-	-	-	1 (1)
South Africa	4	-	2	-	6 (5)
Spain	5	4	5	1	15 (13)
SriLanka	-	-	1	1	1 (1)
Sweden	1	-	-	-	1 (0)
Switzerland	-	1	1	-	2 (2)
Taiwan	-	1	-	-	1 (1)
Tanzania	1	-	-	-	1 (0)
Tunisia	1	-	-	-	1 (0)
Turkey	1	1	-	-	2 (1)
Ukraine	3	-	-	-	3 (0)
UK	55	43	34	11	143 (83)
USA	36	53	24	5	118 (98)
Vietnam	1	-	-	-	1 (1)
TOTAL	266	183	110	56	615 (442)

Figures above refer to total number of copies sold or distributed up to 1 April 1996. GOV = Government/Public funded organization; UNIV = University; COMM = Commercial organization. Number in parenthesis refers to total number of copies sold as opposed to complementary copies.

ANNEX VII

(Extract from GEBCO Guidelines)

1.5 GEBCO MAPPING

1.5.1 GEBCO Bathymetric Editor - Terms of Reference

The GEBCO Bathymetric Editor will be responsible for maintaining a supervisory role over the flow of data relevant to GEBCO by:

- (i) searching out new data sources and ensuring that, within the limits of propriety for publication by originating investigators, all available data are deposited in data banks in timely fashion;
- (ii) keeping himself informed of ongoing and planned field bathymetric programmes throughout the world;
- (iii) be acquainted with and maintain contact with those academic and agency geoscientists and hydrographic services demonstrably interested in and actively researching the geomorphology of the world's oceans, as well as the technical groups engaged in the forefront of processing and manipulation of such data;
- (iv) to receive and assess recommendations from the network of reviewers for the upgrading of the GEBCO Digital Atlas (GDA) and to negotiate for the acquisition of the data and its transmission to the GDA Manager,
- (v) to identify possible compilers of revised blocks of contours, make recommendations to the Guiding Committee and subsequently to liaise with the compilers;
- (vi) to develop close links with the IHO as the World Data Centre for Bathymetry, and the IHO Data Centre for Digital bathymetry at Boulder, USA;
- (vii) to liaise with national and international organizations involved in ocean mapping (e.g., IOC, IHO, ICA and CGMW);
- (viii) to provide active support to the GEBCO Guiding Committee;
- (ix) to work closely with the GDA Manager and to supply all necessary material to the appropriate Establishment which has undertaken to produce and print the GEBCO (6th Edition) printed chart series.

ANNEX VIII

(Extract from GEBCO Guidelines)

1.52 Role of GEBCO Reviewers

Following the publication of the GEBCO (5th Edition) in traditional printed chart form, the bathymetric contours therefrom, together with certain ancillary data (ship tracks, geographical names of undersea features, etc.) were digitized and made available to users on magnetic tape. By creating a structure making this database subject to continual updating and improvement by splicing in new blocks of data as and when they become available, a GEBCO Digital Atlas (GDA) is being maintained which, besides being of considerable value in its own right, can also be used at any time for the preparation of the 6th edition of the traditional GEBCO series.

An essential part of this structure is to have a Network of Reviewers covering all oceanic regions whose task it will be to work with the digital plots and their track control, and to keep the joint IOC-IHO Guiding Committee for the GEBCO fully informed of the availability of new data and where sufficient exists to justify a block revision to any part of the database.

The role of the GEBCO Reviewers will be as follows:

1.5.2.1 Each GEBCO Reviewer is required to:

- (i) Maintain a continuing review of all new bathymetric data that has become available within his area of responsibility since compilation of the relevant GEBCO (5th Edition) sheets;
- (ii) Advise the GEBCO Guiding Committee when sufficient new data have been collected to justify a block revision to any significant part of the database, within his areas of responsibility.

1.5.2.2 To achieve these aims, Reviewers should:

- (i) actively search for new data sources and establish a continuing relationship with the International Hydrographic Organisation (IHO) as the World Data Centre for Bathymetry and/or direct with appropriate IHO Volunteering Hydrographic Offices (VHOs), and with the IHO Data Centre for Digital Bathymetry;
- (ii) bring to the attention of the IHO World Data Centre for Bathymetry or the IHO Data Centre for Digital Bathymetry (as appropriate) the existence of any datasets which have not already reached them;
- (iii) ensure when making any recommendations to the Guiding Committee, that they have an adequate inventory of new data to present in support of their proposals;
- (iv) be prepared to attend and present their proposals in person to the Guiding Committee;
- (v) maintain close liaison with IOCs regional Ocean Mapping bodies (and their Editorial Boards), and with IHO's Regional Hydrographic Commissions, within areas of responsibility,

1.5.2.3 In support of the above aims:

- (i) Volunteering Hydrographic Offices (VHOs) will be asked to provide Reviewers with free updates of 1: 1 million and 1:250,000 Plotting Sheets, on request;

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- (ii) The IHO Data Centre for Digital Bathymetry will provide on request information on all datasets in their possession (with necessary documentation) for Reviewers areas of responsibility.

Note: All correspondence with the Centre should clearly identify the writer as a GEBCO Reviewer.

ANNEX IX

RESOLUTION ADOPTED BY THE IOC ASSEMBLY at its Eighteenth Session, Paris, 13-27 June 1995

Resolution XVIII-10

SUPPORT TO THE JOINT IOC-IHO OCEAN MAPPING PROGRAMME

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,

Recognizing 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,

Recognizing also 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 multi-beam swath-sounding techniques and accurate position control systems,

Emphasizing 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,

Acknowledging 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 and possibly exploit resources within national jurisdiction, and hence the requirement for detailed and accurate bathymetry of the margins,

Thanks the Russian Federation for seconding staff to support the Ocean Mapping Programme;

Instructs the Executive Secretary IOC:

- (i) to initiate discussions on how to establish scientific priorities for bathymetric surveys of the world's oceans and then, in collaboration with the International Hydrographic Organization, to establish a well co-ordinated and comprehensive plan for the coming decade;
- (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 paramount requirement for meetings of the Editorial Board for the International Bathymetric Chart of the Central Eastern Atlantic (IBCEA) (possibly in Lisbon or Brest) in 1996, of the Editorial Board for the International Bathymetric Chart of the Western Pacific (IBCWP) by 1996, and of CGOM early in 1997;

Invites the Director-General of UNESCO to establish one professional post for the Ocean Mapping Programme as of 1996;

Invites the International Hydrographic Organization to consider the above proposal, and assist with the development of a plan for the proposed co-ordinated bathymetric surveys.

ANNEX X

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ANNEX XI

LIST OF ACRONYMS

ACUF	Advisory Committee on Undersea Features (of BGN)
AGSO	Australian Geological Survey Organization
AGC	Atlantic Geoscience Centre, Geological Survey of Canada
AGU	American Geophysical Union
AWI	Alfred-Wegener-Institut für Polar- und Meeresforschung (Bremerhaven, Germany)
BAS	British Antarctic Survey
BGN	Board on Geographic Names (USA)
BODC	British Oceanographic Data Centre (Bidston Observatory, Birkenhead, UK)
BRIDGE	Mid-ocean ridge project of NERC
CAP	Circum-Atlantic Project (of IUGS)
CD-ROM	Compact Disc - Read Only Memory
CEDD	Committee on Exchange of Digital Data (IHO)
CGM	Carte générale du monde (IGN)
CGOM	Consultative Group on Ocean Mapping (of IOC)
CHRIS	Committee on Hydrographic Requirements for Information Systems
CHS	Canadian Hydrographic Service
CICESE	Centro de Investigación Científica y Educación Superior de Ensenada (Mexico)
CLCS	Commission on the Limits of the Continental Shelf (UNCLOS)
C M G	Commission for Marine Geology (IUGS)
COE	Committee on Electronic data (IHO) (formerly Committee on ECDIS)
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
DBDB-V	Digital Bathymetry Data Base
DBWG	Data Base Working Group (IHO)
DCDB	Data Centre for Digital Bathymetry (IHO - at NGDC, Boulder, Colorado, USA)
DEM	Digital Elevation Model
DMA	Defense Mapping Agency (USA)

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ECDIS	Electronic Chart Display and Information System (IHO)
EEZ	Exclusive Economic Zone
EPSHOM	Etablissement Principal du Service Hydrographique et Océanographique de la Marine
ERS- 1	European Research Satellite- 1
ESA	European Space Agency
ETOPO5	Earth Topography on a 5-minute grid (NGDC)
EU	European Union
GBE	GEBCO Bathymetric Editor
GDA	GEBCO Digital Atlas
GEBCO	General Bathymetric Chart of the Oceans (IOC/IHO)
GEODAS	GEOphysical DATA System for Marine Geophysical Data (NGDC)
GIS	Geographic Information System
GMT	Generic Mapping Tools (P. Wessel and W.H.F. Smith)
GOOS	Global Ocean Observing System (IOC)
GPS	Global Positioning System
GSA	Geological Society of America
HDNO	Head Department of Navigation & Oceanography (USSR Ministry of Defence, St Petersburg)
HYDAS	HYdrographic DATA System for Marine Geophysical Data (NGDC)
IASC	International Arctic Science Committee
IBCCA	International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IOC)
IBCEA	International Bathymetric Chart of the Central Eastern Atlantic (IOC)
IBCM	International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (IOC)
IBCWIO	International Bathymetric Chart of the Western Indian Ocean (IOC)
IBCWP	International Bathymetric Chart of the Western Pacific (IOC)
ICA	International Cartographic Association
ICSU	International Council of Scientific Unions
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
IGN	Institut géographique national (Paris, France)

IH	International Hydrographic (Review and Bulletin)
IHB	International Hydrographic Bureau
IHO	International Hydrographic Organization
INEGI	Instituto Nacional de Estadística, Geografía e Informática (Mexico)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IUGS	International Union of Geological Sciences
MGD77	Magnetics, Gravity and Depth Format 1977 (NGDC)
NATO	North Atlantic Treaty Organization
NAVOCEANO	US Naval Oceanographic Office
NERC	Natural Environment Research Council (Swindon, UK)
NGDC	National Geophysical Data Center (Boulder, Colorado, USA)
NGS	National Geographic Society (USA)
NMDIS	National Marine Data and Information Service (China)
NOAA	National Oceanic and Atmospheric Administration (USA)
NOS	National Ocean Service (USA)
NRL	Naval Research Laboratory (USA)
NSF	National Science Foundation (of USA)
NZOI	New Zealand Oceanographic Institute (NIWAR)
OMG	Ocean Mapping Group (University of New Brunswick, Canada)
PSMSL	Permanent Service for Mean Sea Level
PWGCA	Permanent Working Group for Co-operation in the Antarctic
RAN	Royal Australian Navy
WV	Research Vessel
S.57	IHO Transfer Standard for Digital Hydrographic Data
SACLANT	Supreme Commander Allied Command Atlantic (NATO)
SAR	Synthetic Aperture Radar
SCAR	Scientific Committee on Antarctic Research (ICSU)
SCDB	Sub-Committee on Digital Bathymetry (GEBCO)
SCOR	Scientific Committee on Oceanic Research (ICSU)

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SCUFN	Sub-Committee on Undersea Feature Names (GEBCO)
SHOM	Service Hydrographique et Océanographique de la Marine
SIO	Scripps Institution of Oceanography (La Jolla, USA)
SOC	Southampton Oceanography Centre
SOPAC	South Pacific Applied Geoscience Commission
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Scientific and Cultural Organization
USGS	United States Geological Survey
USNOO	US Naval Oceanographic Office
VHO	Volunteering Hydrographic Office (IHO)
WDC	World Data Centre
WESTPAC	Western Pacific regional programme of the IOC
WGS-84	World Geodetic System 1984
w v s	World Vector Shoreline (DMA)
WWW	World Wide Web