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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of Unesco)

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

Joint IOC/IHO Guiding Committee for the GENERAL BATHYMETRIC CHART OF THE OCEANS

Fourteenth Session, Scripps Institution of Oceanography,
La Jolla, California, U.S.A., 4-6 May 1993

SUMMARY REPORT

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SUMMARY REPORT

ANNEXES

1. OPENING OF THE SESSION

The Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO) was held at the Scripps Institution of Oceanography, La Jolla, California, USA. Sir Anthony Laughton, Chairman GEBCO, opened the session at 09.30 on Tuesday 4 May 1993. 1

Dr Robert L.Fisher welcomed the participants on behalf of the Scripps Institution and Mr Desmond P.D.Scott on behalf of Dr Gunnar Kullenberg, Secretary IOC. 2

The Chairman welcomed: 3

Capitão-de-Corveta Lucas de Campos Costa (Brazil)
Mr Alexis E.Hadjiantoniou (Greece)
Mr Kunio Yashima (Japan)
Rear Admiral Christian Andreasen

to the first session of the Guiding Committee they had attended.

A full List of Participants is given in Annex VI. 4

Apologies for absence had been received from: 5

Mr David Monahan;
Capitán de Navio J.M.Fernandez de la Puente;
Dr G.Leonard Johnson; and
Mr Donald E.Pryor.

2. CONDUCT OF THE SESSION

2.1 Adoption of the Agenda

The Agenda was adopted with two minor alterations - see Annex I. 6

2.2 Documentation; Administrative Arrangements; etc.

The Permanent Secretary introduced the documentation - see Annex II. The Administrative Arrangements and Social Programme were presented. 7

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

It was reported that the following changes had taken place since the Thirteenth Session of the Guiding Committee in June 1991: 8

GEBCO Guiding Committee 9

- Mr Kunio Yashima (Japan)
  had replaced Ingénieur en Chef Jean Laporte (France).

- Mr Alexis E.Hadjiantoniou (Greece)
  had replaced Dr Lysandros Tsoulos (Greece).

10 Owing to the resignation of Dr Robert L.Fisher (announced at the close of the present session: see item 16.2 below), one vacancy now exists on the Guiding Committee.

11 **Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features**

- Mr Kunio Yashima (Japan)
  had replaced Ingénieur en Chef Jean Laporte (France)

- Rear Admiral Christian Andreasen (IHB)
  had replaced Rear Admiral Alfredo Civetta (IHB).

12 **Sub-Committee on Digital Bathymetry**

- Mr Alexis E.Hadjiantoniou (Greece)
  had replaced Dr Lysandros Tsoulos (Greece).

4. MATTERS ARISING FROM PREVIOUS MEETINGS

4.1 Summary Report of the Thirteenth Session of the Joint IOC-IHO Guiding Committee for the GEBCO (doc. IOC-IHO/GEBCO-XIII/3)

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

4.2 Short Summary Record of Discussion at the Eighth Meeting of the GEBCO Officers (doc. IOC-IHO/GEBCO Officers-VIII/3)

Paragraph 12 Staff Posts for 'Ocean Mapping' in the IOC Secretariat in Paris and in the IOC-ICSEM Operational Unit for the Mediterranean, Monaco.

14 The Secretary recalled that for some years both these posts had been filled by Russian seconded personnel but that the existing incumbents had been withdrawn in April 1992 and December 1991 respectively, due to funding difficulties. He could now report that there was a strong likelihood that the post in the IOC Secretariat would be filled later in 1993, and there was a possibility that the Monaco post would be filled in 1994. It was suggested that it would be advantageous if the second post could in future be sited in the I.H.Bureau to work with Michel Huet. This was agreeable to IHB.

Paragraph 69 Report of the IHO Working Group on Oceanic Plotting Sheets (WG/OPS)

15 Brian Harper reported that the final report of the IHO Working Group on Oceanic Plotting Sheets had been presented to the XIVth International Hydrographic Conference in May 1992, and the

recommendations therein had been adopted. One of these was that 'all remaining Ocean Plotting Sheets should be phased out (in favour of digital recording of soundings) by 1996'. He also drew attention to Part 2B of the GEBCO Guidelines (see item 12 below) which had now been finalized following adoption of the Working Group's report.

Paragraph 84 Archive relating to the deepest depths in the Deep Trenches

Michel Huet reported that an archive for material relating to the deepest depths in the Deep Trenches had been established at the IHB, and the Japan Hydrographic Department had deposited material from their survey of the Challenger Deep, including documentation and echograms. It was agreed that a copy of Robert Fisher's listing 'Maximum Depths/Soundings of Principal and Notable Ocean Deeps (as of October 1992)' should also be deposited in the archive, together with copies of relevant articles on the subject, by Robert Fisher and Stuart Smith. An article had been published in the March 1993 issue of the I.H.Bulletin - copies would be sent to all members of the Guiding Committee. 16

5. REVISED TERMS OF REFERENCE FOR THE GUIDING COMMITTEE

The Secretary reported that, following a number of objections raised during IHC-XIV in May 1992 to the draft text which had been proposed by GEBCO Officers (doc. IOC-IHO/GEBCO Officers-VIII/3, Annex IV), a revised version had been prepared and this had been adopted by the IOC Assembly in March 1993 (Resolution XVII-4). 17

The Guiding Committee made a few minor editorial adjustments to the text (see Annex III), and the Representative of the IHB confirmed that this would be sent out shortly to IHO Member States with a request for their approval. On receipt of this approval, the Terms of Reference will come into force. 18

6. REPORT OF THE IOC CONSULTATIVE GROUP ON OCEAN MAPPING (CGOM) TO THE SEVENTEENTH SESSION OF THE IOC ASSEMBLY, PARIS, 25 FEBRUARY - 11 MARCH 1993 (doc. IOC/INF-899)

Desmond Scott, Chairman CGOM, spoke on the above report which he had presented to the IOC Assembly in February 1993. 19

He pointed out that the IOC's Ocean Mapping programme consisted of three parts. The GEBCO, the International Geological-Geophysical Atlases of the Atlantic and Pacific Oceans (GAPA) and the regional International Bathymetric Chart series. 20

The GAPA Atlantic Ocean atlas had now been published and placed on sale for US $230 through Seabeam Instruments Inc., BSE Corp (Business Science Exchange Corporation) and Dr Robert Tyce for the Americas, and he (Scott) was selling them for sterling £100 in Europe. The 21

Pacific Atlas was now about 50% compiled and was scheduled for publication in 1995.

22 The International Bathymetric Chart of the Mediterranean and its Geological-Geophysical Series (IBCM) was in an advanced stage of preparation. The Plio-Quaternary/Messinian Sediments series would be published later this year and two further series: Unconsolidated Sea-bed Surface Sediments and Magnetic Anomalies would follow. At the same time work was proceeding on the compilation of a second edition of the bathymetric series but it was unrealistic to expect this to be ready before 1996 at the earliest.

23 The first sheet of the International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA) had been published and four more are scheduled for publication this year.

24 Of the other series, the International Bathymetric Chart of the Central Eastern Atlantic (IBCEA) was most advanced, with proof copies of the first sheets expected soon. The IBCs of the Western Indian Ocean (IBCWIO) and the Western Pacific (IBCWP) were at an early stage of development and all were suffering from lack of funding.

25 In response to a question, he confirmed that digitized versions of the regional International Bathymetric Chart series would be incorporated into the GEBCO Digital Atlas (GDA). Geog. José Frias reported that plans were in hand to create a digital database for the IBCCA and a first draft of the specifications was being prepared by Dr Angel García (Cuba). The importance of ensuring that the database could be easily fed into the GDA was stressed. Geog. Frias was asked to inform the EB-IBCCA that the GEBCO Guiding Committee was willing to assist with the preparation of these specifications, and the best link would be with the GEBCO Bathymetric Editor, Mr Peter Hunter, who had already written to Dr Angel García (copy to Dr Néstor Duch Gary) offering his help.

7. MID-CONTRACT REPORTS ON WORK CARRIED OUT BY, AND ACTIVITIES OF:

7.1 THE GEBCO BATHYMETRIC EDITOR

26 Mr Peter Hunter, GEBCO Bathymetric Editor, presented his 'Interim Report, April 1990 to December 1992' (doc. IOC-IHO/GEBCO-XIV/7 rev.) to the Guiding Committee. He reported that initially his principal task had been to contact people worldwide to find out what they are doing, and in the first two years he had visited 50 scientific establishments/government agencies in eleven countries. In so doing he had achieved considerable success in locating many new sources of data, and also in opening up links with commercial firms and cable companies with which he had initiated arrangements for exchange of data and information. In fact he had found himself used as a contact point outside GEBCO. He had been interested to find out how people were using their data and the techniques being used.

Details of the GBE's visit to the Western Pacific region will be found in Annex IV to the Summary Report of the ninth meeting of the GEBCO Sub-Committee on Digital Bathymetry (doc. IOC-IHO/GEBCO SCDB-IX/3). 27

A considerable amount of time had been spent on the compilation of revised sheet 5.12 (see item 11 below), but this was now coming to an end. Other tasks were: acting as a GEBCO Reviewer for the North-east Atlantic, and updating contours for that region; and developing a system whereby persons with simple computer facilities could produce contours suitable for GEBCO. 28

Now that the GEBCO Digital Atlas (GDA) is fully operational, his main immediate focus for the future will be to work on updating procedures, and actual periodic updating of the GDA - see also item 10.4 below). 29

7.2 THE GEBCO DIGITAL ATLAS MANAGER

The work of Pauline Weatherall is covered in the 'Progress Report on BODC support for the GEBCO Digital Atlas (June 1990 - March 1993)' (doc. IOC-IHO/GEBCO-XIV/6). See item 10 below. 30

The Guiding Committee acknowledged the large amount of extremely valuable work carried out by Pauline Weatherall since she has been in post. This has resulted in a high class product of considerable importance. 31

7.3 THE NERC UNIT FOR THEMATIC INFORMATION SYSTEMS (NUTIS) - GEBCO PROJECT

Dr Gary Robinson presented an interim report on the activities of the NERC Unit for Thematic Information Systems (NUTIS) within the GEBCO Project (doc. IOC-IHO/GEBCO-XIV/8). He gave an update on this project, saying that development of the Trident bathymetric visualization, editing and modelling computer system had been temporarily suspended until the existing system had been migrated to a Sun Space Station environment. It was hoped that a test version would be available by the end of 1993 for testing of the visualization and editing elements by Peter Hunter. 32

He then presented a draft paper on 'Automated Annotation in the GEBCO Digital Atlas' which reviewed the current status of automated labelling of maps and charts, and its possible application to bathymetric charts, in particular the GDA. A critical point in this task was the requirement that bathymetric features should have their areal (or linear) extents defined. How this should be implemented, and by whom, was recommended to be the subject of further investigation. The implications for the Gazetteer of Undersea Feature Names were discussed, since at present only three co-ordinates are used to define the extent of features. 33

34 It was noted that the Sub-Committee on Digital Bathymetry had invited Gary Robinson to prepare (in consultation with Michel Huet) a short working paper on the portrayal, and in particular the automated annotation, of undersea feature names listed in the Gazetteer, for consideration at GEBCO SCDB-XI (May 1994).

8. SUB-COMMITTEE ON GEOGRAPHICAL NAMES AND NOMENCLATURE OF OCEAN BOTTOM FEATURES

35 Dr Robert L.Fisher, Chairman GEBCO/SCGN, introduced this item and presented the report of the Tenth Meeting of his Sub-Committee, which had been held at the Scripps Institution of Oceanography, La Jolla, 29 April - 3 May 1993. In taking the Guiding Committee through the report in some detail, he stated that, although approved by the Sub-Committee, it would need a considerable amount of checking and editing (particularly the many geographical co-ordinates listed) before the text (doc. IOC-IHO/GEBCO SCGN-X/3) could be finalized.

36 The Guiding Committee expressed its appreciation for the considered proposals, advice and general input provided for names of undersea features in Australian waters by the RAN Hydrographic Service and the Australian Geological Survey Organization (formerly Bureau of Mineral Resources), regarding the names to be shown on their ORMS map series now being compiled. It was decided that Captain J.J.Doyle should be invited to become an Adviser to the Sub-Committee.

37 The attention of the Guiding Committee was drawn to the use of the names CUVIER, WALLABY and ZENITH for a number of features off the west coast of Australia. These names have over the years been used for different features, and unwieldy names such as Cuvier (Wallaby) Plateau and Wallaby-Zenith Fracture Zone are being shown on these sheets. The Guiding Committee acknowledged that it is partly to blame for this situation in that on sheet 5.09 (published April 1982), and in the Gazetteer, the feature in position 22°S.,104°E. was incorrectly named 'Wallaby Plateau', whereas the historical name for this feature (after the cable ship which made the original discovery) is 'Zenith Seamount' (ref: Veevers et al., 1985, also e.g. DMA Chart 5446, June 1933, and Australian Chart INT708, May 1975) - subsequent investigation has shown that the feature is a plateau so the name should now be 'Zenith Plateau' (as proposed by Veevers). In addition the Guiding Committee proposed (for consideration by the Australian authorities):

Cuvier Plateau	23°06'S.) 108°39'E.)	to	25°15'S.) 108°30'E.)
Cuvier Escarpment	24°30'S.) 106°45'E.)	to	27°20'S.) 110°40'E.)
Wallaby Saddle	25°30'S.) 109°30'E.)	to	24°20'S.) 109°50'E.)

38 The Guiding Committee accepted the proposals of the Sub-Committee regarding the names of undersea features to be shown on revised Sheet 5.12 (item 11 below). A number of small changes, which were made to these proposals with the full agreement of the Chairman and members of GEBCO-SCGN present, have been incorporated into the report of the Sub-Committee. An advance copy of the proposals was passed to Peter Hunter (GBE) so he could amend the names sheet before the material was passed to the CHS for reproduction.

39 A study was made of the evidence, including new material, regarding the position and orientation of the feature known by GEBCO as 'Egeria Fracture Zone' and by ACUF as 'Rodrigues Fracture Zone'. The Guiding Committee agreed with the view put forward by the Sub-Committee and confirmed its invitation to ACUF to reconsider their decision regarding this name.

8.1 Revised Terms of Reference for the Sub-Committee

40 The Chairman of the Sub-Committee tabled for the consideration of the Guiding Committee a draft text for revised Terms of Reference (doc. IOC-IHO/GEBCO SCGN-X/3, Annex 4). These had been modified from a first draft which had been prepared by IHB.

41 Further modifications were made and a final text (see Annex III B) was agreed and approved.

42 The Guiding Committee also accepted the proposal of the Sub-Committee that its name should be changed to: The GEBCO Sub-Committee on Undersea Feature Names (SCUFN), as more indicative of its task and also less ponderous to spell out.

8.2 Liaison and Co-operation with the U.S. Board on Geographic Names/Advisory Committee on Undersea Features (BGN/ACUF)

43 The Guiding Committee noted the statement made to the Sub-Committee by Dr Richard Randall, Executive Secretary, US Board on Geographic Names (ref: doc. IOC-IHO/GEBCO SCGN-X/3, Annex 3), and reaffirmed its intention to work closely with BGN/ACUF and any other national bodies having responsibility for the naming of undersea features.

44 It welcomed the statement made by Tony Gregory, Secretary, Advisory Committee on Undersea Features, that following a careful study of the decisions taken by the Sub-Committee at its ninth meeting (doc. IOC-IHO/GEBCO SCGN-IX/3), he had found the differences with ACUF were minimal. The Guiding Committee still considered however that any substantial differences of opinion should always be investigated further and overcome if at all possible. The Guiding Committee would invite ACUF to reconsider any decision which, following advice from the Sub-Committee, it found itself unable to accept. Attention has been drawn to one such example in paragraph 39 above.

8.3 Standardization of Undersea Feature Names (BP-0006)

45 The Permanent Secretary reported on the state of preparation and publication of the various language versions of this publication:

English/French	2nd Edition published July 1989;
English/Russian	2nd Edition published July 1990;
English/Spanish	1st Edition published 1985 2nd Edition in press *;
English/Japanese	1st Edition published October 1991;
English/Chinese	1st Edition in press;
English/German	Work has been delayed but will be resumed;
English/Portuguese	Being compiled.

46 [* Following a decision taken at the eighth meeting of the GEBCO Officers (IOC-IHO/GEBCO Officers-VIII/3, item 7.2), the first draft of the 2nd Edition of the English/Spanish version was printed by IHB in April/May 1993. Unfortunately a revised text was received unexpectedly from the Editorial Board for IBCCA very shortly thereafter. A decision as to how to deal with this situation will be made shortly.]

9. SUB-COMMITTEE ON DIGITAL BATHYMETRY

47 The Chairman of the Sub-Committee, Dr Meirion T.Jones, reported on the discussions which had taken place during the tenth meeting of his Sub-Committee which had met at the National Geophysical Data Center, Boulder, Colorado, 29 April-1 May and at Scripps Institution of Oceanography on 3 May 1993.

48 It had been a lively and stimulating meeting with 28 invited persons from 21 organizations and 10 countries.

49 The Sub-Committee had started its proceedings by carrying out its annual review of related activities of other international and national groups:

i. IHO Committee on Exchange of Digital Data (CEDD), Committee on ECDIS (COE), and related Working Groups, including work being carried out on data bases and revision of SP44 (Andreasen);
ii. ICA Working Group on Marine Cartography - there is minimal overlap with this group (Jones);
iii. IOC International Bathymetric Chart of the Mediterranean and its Geological-Geophysical Series (IBCM), in particular plans to produce a second edition of the base bathymetry which will be used by Dr John Hall for a testbed using new techniques (Hall);
iv. IOC International Bathymetric Chart of the Caribbean and Gulf of Mexico (IBCCA) (Holcombe);
v. IOC International Bathymetric Chart of the Central Eastern Atlantic (IBCEA) (Le Gouic);

vi. IHO Working Group on Co-operation in the Antarctic (Andreasen);
vii. Scientific Committee on Antarctic Research (SCAR), including British Antarctic Survey (BAS) development of a CD-ROM under the auspices of SCAR (Schenke);
viii. International Arctic Scientific Committee (IASC) Working Group on Geophysical Compilation and Mapping - Implementation Plan (Macnab) - see also item 13 below;
ix. South Pacific Applied Geoscience Commission (SOPAC) (Eade);
x. Alfred-Wegener Institut für Polar- und Meeresforschung (AWI), in particular plans and progress in producing their Bathymetric Charts of the Weddell Sea (Schenke), including presentation on techniques being used for mapping in the Weddell Sea (Hinze);
xi. U.S. Naval Research Laboratory (NRL) - focus on Greenland, Barents and Kara Seas, but also work on South Atlantic, Arabian Sea and the Western Pacific (Cherkis);
xii. Bundesamt für Seeschiffahrt und Hydrographie (BSH), Hamburg - development of a national database (to provide input to IHO/DCDB) (Schenke);
xiii. U.K. Hydrographic Office (Harper);
xiv. NERC Unit for Thematic Information Systems (NUTIS) (Robinson);
xv. Atlantic Geoscience Centre/ Geological Survey of Canada (Macnab);
xvi. Ocean Mapping Group (OMG), University of New Brunswick (Mayer) - use of tools for the visualisation of data, and mapping test beds in the Bay of Fundy (Mayer);
xvii. Scripps Institution of Oceanography (SIO) - presentation on the analysis of gravity data, particularly south of 30°S, from GEOSAT, including research into the transfer function between gravity and bathymetry (Smith and Sandwell);
xviii. U.S. National Geophysical Data Center (NGDC) - development of a topographic CD-ROM (Loughridge).

50 It was reported that the British Antarctic Survey (BAS) were producing a CD-ROM under the auspices of the Scientific Committee on Antarctic Research (SCAR) (Working Group on Geodesy and Sub-Committee on Bathymetry and Hydrography). Hans Schenke is a member of these groups and will act as link man with the GEBCO. He recommended the use of the SCAR coastline for the GEBCO (6th Edition) as it is necessary to distinguish between Sea Ice edge (Arctic) and Shelf Ice edge (Antarctic). He also reported that the German national project will develop: a large scale International Bathymetric Chart (IBC) of part of Sheet 5.16;
and a block correction to Sheet 5.16.

51 Concern was expressed that very little UK/NERC data (including BAS data) are getting into international depositories. Michael Loughridge reported that the trading deficit with NERC was growing. The GBE was instructed to research the problem and produce a summary of the situation.

52 Michael Loughridge had presented a Status Report on the activities of the IHO Data Centre on Digital Bathymetry (DCDB) which had been accepted as most satisfactory. The Sub-Committee had been particularly impressed by the publication of a GEODAS CD-ROM which revolutionizes the dissemination of sounding data.

53 This had been followed by a discussion on developments at NGDC in planning for the handling of multibeam data, including the outstanding need to develop a further section (Part 4) of the 'GEBCO Guidelines' on this subject (see section 12 below). George Sharman and Stuart Smith had been invited to develop a first draft working document, taking into account developments elsewhere, e.g. IFREMER, AWI, etc., for consideration at GEBCO SCDB-XI (May 1994).

54 Other matters discussed were

A draft working paper 'Automated Annotation in the GEBCO Digital Atlas', prepared by Gary Robinson (NUTIS) (item 7.3 above)
Preparation of Revised Terms of Reference for the Sub-Committee (item 9.1 below);
Global Horizontal Reference System (item 9.3 below);
Progress with the GEBCO Digital Atlas (GDA), including finalization of the GEBCO (5th Edition) contours and tracklines (item 10.1 below);
Procedures for updating the GEBCO Digital Atlas (GDA) (item 10.4 below);
Preparation of the GDA CD-ROM (item 10.5 below).
Revised final text of the GEBCO Guidelines Part 2B Bathymetric Data Management - Digital Data - a number of minor amendments had been proposed (item 12 below)

9.1 Revised Terms of Reference for the Sub-Committee

55 The Chairman of the Sub-Committee tabled for the consideration of the Guiding Committee a draft text for revised Terms of Reference. He noted that digitization of the GEBCO (5th Edition) had now been completed so this had been considered to be an opportune occasion to update the Sub-Committee's Terms of Reference. He explained that the existing Terms of Reference had been adopted in 1984 and that developments that had taken place at each meeting over the past several years had set the backdrop for the revised text. Also they had been made compatible with the proposed revised Terms of Reference of the Guiding Committee (item 5 above).

56 The text submitted (see Annex III C) was approved without alteration.

9.2 IHO Data Centre for Digital Bathymetry (DCDB)

Michael Loughridge, Director DCDB, presented a short report on the activities of the data centre. The Guiding Committee accepted the view of the Sub-Committee (paragraph 52 above) that progress had been satisfactory. 57

He continued by saying that, apart from the specific case discussed above (paragraph 51), there was a more general requirement for an increase in the flow of data in order to improve the definition of the sea floor for the use of climate research modellers. The Guiding Committee recommended that both IHO and IOC urge their member states operating hydrographic survey/research ships to require them to collect and submit bathymetric data when on passage between working areas, particularly in data-sparse regions. 58

9.3 Global Horizontal Reference System

The Representative of the IHO introduced this item, drawing attention to a resolution that had been adopted at the IUGG General Assembly in August 1991, and two recommendations which had been adopted at the First International Conference on Geodetic Aspects of the Law of the Sea, Denpasar, Bali, Indonesia, 8-13 June 1992. He noted that anyone working with GPS needs a common world datum, and the World Geodetic System 1984 (WGS 84) had been adopted for this purpose. 59

The Guiding Committee recognized that the GEBCO was only one of many marine applications needing such a datum, and adopted the recommendation in Annex IV. 60

10. GEBCO DIGITAL ATLAS (GDA)

The Guiding Committee noted and accepted with great appreciation the 'Progress Report on BODC Support for the GEBCO Digital Atlas (June 1990 - March 1993)' (doc. IOC-IHO/GEBCO-XIV/6). 61

Meirion Jones requested guidance (in particular for the GBE and the GDA Manager) regarding the structure and content of the GDA. He pointed out that now the 'seamless' dataset was virtually complete (item 10.1 below), and preparation of the CD-ROM was well advanced (item 10.5 below), the main development over the next year would be the routine updating of the GDA as and when new data become available anywhere in the world. He would prefer to take all data in as it becomes available so as to spread the workload. This would make the job of updating easier as the material held could be reviewed periodically and a selection made of which material should go for approval and 'stitching in' to the seamless dataset. 62

63 The Guiding Committee discussed whether the GDA should become a two-tier system:

1. The seamless global dataset (from which the printed chart is produced);
and 2. A basic digital bank of contour data which have not been edge-matched into the surrounding parts of the GDA.

A possible analogy would be that Tier 1 is the atlas and Tier 2 contains annexes thereto. It was agreed that further work will be needed on this problem - see paragraphs 77-79 below.

64 Robin Falconer drew attention to the need for continuous contours in the 'seamless' dataset where there are colour changes in the printed chart; hanging contours are acceptable elsewhere.

10.1 Progress with the GEBCO Digital Atlas (GDA)

65 Meirion Jones reported that provision of a seamless global dataset was now virtually complete and would be issued, on magnetic tape, as soon as the final changes to the contours on revised Sheet 5.12 (approved at this session - see item 11 below) had been incorporated.

66 Work on digitization of tracklines had been completed and will be incorporated into the GDA when issued as a CD-ROM (see item 10.5 below).

10.2 Global Network of Reviewers

67 The List of Reviewers and accompanying plan (see Annex V) were considered and updated. Gleb Udintsev proposed that the name of Alexander S.Svarichevskiy from the Pacific Oceanology Institute, Far East Science Centre of the Russian Academy of Sciences, be added to the list for the North-west Pacific Ocean. This was agreed and the limits between areas of responsibility in this region were adjusted.

68 The Representative of the IHO was asked to make enquiries of NOAA regarding the nomination of a Reviewer for the North-east Pacific. If this proved unacceptable, a further investigation of possibilities would be undertaken, possibly at the US Geological Survey.

69 It had come to be realised that the term 'Reviewer' had been causing misunderstandings as the Reviewers in this context (see Role of GEBCO Reviewers: GEBCO Guidelines section 1.5.2) were being confused with the other type of reviewer who studied and approved the content before publication of a new printed sheet, e.g. revised Sheet 5.12 (item 11 below), or new material to be used for updating the GDA (see the title to item 10.4 below). The Guiding Committee invited the GEBCO Officers to consider this problem and propose a viable solution.

10.3 Preparation of a Prioritized Work List for the GDA Manager

The Guiding Committee studied the list that had been agreed by the GEBCO Officers (ref: doc. IOC-IHO/GEBCO Officers-VIII/3, paragraph 61) and noted with satisfaction that all except the last two: incorporation of Geographical Names into the GDA and development of methodology for updating the GDA had been completed. The former would be completed this year in time for incorporation into the CD-ROM (item 10.5 below), leaving the latter to become the main task for the GDA Manager (working in consultation with the GBE) over the coming year. 70

The GEBCO Officers had however qualified their list with a remark: 'In parallel with the above, and ensuring that no large backlog builds up, (she should) continue work on the extended Indian Ocean material being compiled by Robert Fisher.' This in fact had not happened and only 4 of 75-80 plotting sheets submitted had so far been digitized. Furthermore there were now some 150 plotting sheets ready for digitization. Robert Fisher reported that he had now completed work on the area west of 80°E. and he hoped to be able to lift the embargo on release of these data by the end of the year. 71

Robert Fisher, in his capacity as the GEBCO Reviewer for the Indian Ocean (see item 10.2 above), formally advised the Guiding Committee that there was a substantial new database in his area of responsibility which should be considered for updating the GDA. The Guiding Committee agreed that the material being offered by Robert Fisher was of outstanding quality and quantity and that this should be the first material to be used for updating the GDA (paragraph 71 above and item 10.4 below), and subsequently in the appropriate sheets of the GEBCO (6th Edition). 72

It was noted however that there were two major problems: the staff time available in BODC to digitize this very large amount of data; and the constraints put on GEBCO, as an international project in the public domain, from processing data which at this stage had an embargo on its release. 73

[Robert Fisher, Stuart Smith and Pauline Weatherall, GDA Manager, discussed the present situation and way ahead in a series of meetings out of the GEBCO session, and came to an agreed and satisfactory arrangement regarding digitization work that could undertaken by an SIO employee and that to be undertaken at BODC by, and under the supervision of, the GDA Manager over the next year.] 74

10.4 Procedures for Updating the GDA, incorporating a Reviewing Process

Peter Hunter, GBE, drew attention to the considerable amount of new material already either available or being compiled which will have to be inputted into the GDA as soon as time and effort permits: 75

Fisher - material from the greater Indian Ocean (paragraph 71 above) - to be given priority subject to periodic lifting of embargo on release into the public domain;
Cherkis - material from the South Atlantic (item 11 below) and from a new chart under compilation: Norwegian, Greenland, West Barents and Kara Seas;
Hunter - Lau Basin,
- Work on UK Continental Shelf by BGS,
- South-west Approaches to the United Kingdom;
Schenke - Weddell Sea;
Falconer - Macquarie Ridge,
Carter - NZOI bathymetry of New Zealand waters;
Johnston (AGSO) - ORMS (resource) maps;
Udintsev/Svarichevskiy - Sea of Okhotsk;
Tani/Yashima - 'The Southern Seas of Nippon';
Eade - SeaBeam material from the SOPAC area;
Duch Gary - International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (IBCCA).

76 The following basic principles were accepted as necessary to form the basis for the development of viable updating procedures:

i. At this stage updating should be confined to vector contours and track control - gridded datasets and DTMs may follow.
ii. The trigger for identification of sufficient material to justify a block correction, both contoured and uncontoured data, should come in the form of a recommendation from a Reviewer (item 10.2 above) - for an example see also paragraph 72 above.
iii. A second judgment should be provided on the Reviewer's recommendation, either by the GBE or by an Approval Panel (this should not be a standing panel) consisting of the Originator and two persons from outside the area, to act as referees.
iv. Approval Panels should only be required to review contoured material, i.e. contoured data on receipt, but only after contouring if new data are received uncontoured.
v. The Originator or the GBE should obtain a third opinion whenever this is considered necessary - the GEBCO Officers can be approached at any time.
vi. Close collaboration between Originators and GEBCO staff will be essential - each case will have to be decided on its merits.
vii. Data will come in a number of forms and scales - block limits will become clearer by experience.
viii. Generalisation of data being inputted into the GDA should be minimal or useful data will be lost.
ix. Initial 'stitching in' should, if possible, be carried out by the Originator - outside the block limits rather than inside - the GDA Manager however retains responsibility for the final 'stitching in'.
x. The scale of new material should not normally be larger than 1:500,000 (exceptionally 1:250,000).

xi. Minimum area cover should be 5°x5° but these figures should be flexible, i.e. this is an area limit, not a dimension limit.
xii. The new material should show a significant improvement on existing content of the GDA.
xiii. Where new data are undigitized good material may be lost if GEBCO does not process it, but GEBCO should not become a free digitizing service for data collectors, i.e. the role of GEBCO in digitizing needs to be defined.
xiv. Originators should be encouraged to undertake their own digitizing and contouring, preferably to GEBCO standards.
xv. Interpolation may be needed if the new material does not follow GEBCO standards.

77 The GBE was invited to prepare a complete revision of his preliminary paper 'Updating the GEBCO Digital Atlas', taking into account the above principles and the discussion which had taken place during the current session. The paper should include a procedural structural diagram. Key stages in the process were seen to be the interaction with Reviewers (item 10.2 above) and with referees (paragraph 76, sub-paragraph iii above).

78 Copies of the paper should then be sent out to all persons included in the GEBCO Personality List with a request for comments. In the same despatch the GEBCO Reviewers should be sent a letter clarifying their duties and the actions expected of them.

79 An item on this subject should be included in the agenda for the ninth meeting of the GEBCO Officers (May-June 1994), with a working paper detailing (in the form of tables if clearer):
Recommendations received from Reviewers;
Material that has been inputted into GDA Tier 1;
Material that has been inputted into GDA Tier 2;
Material that is ready for transfer from Tier 2 to Tier 1;
Any other relevant information.

10.5 Electronic publishing of GEBCO Products

80 Meirion Jones presented a prototype of the GEBCO Digital Atlas CD-ROM which was being developed at BODC following the Draft Specification which had been drawn up during the ninth meeting of the Sub-Committee in April 1992 (ref: doc. IOC-IHO/GEBCO SCDB-IX/3, Section 4.3 and Annex VI).

81 The presentation was well received by the Guiding Committee which acknowledged the excellent work being done by Dr Andrew Tabor and authorised Meirion Jones to proceed with further work on, and completion of, the CD-ROM product with a view to its being released as soon as possible. It was considered that as a basic product it would reflect well on the GEBCO.

82 The first release will include:

i. The digitized bathymetric contours and coastline from the GDA - these are based on the GEBCO (5th Edition) but in certain areas, mainly the South Atlantic (Sheet 5.12) and the south-western part of the North Pacific (Sheet 5.06), the material has been updated;

ii. Digitized tracklines from the GDA - showing, for quality control, the density of data used for compilation of the bathymetric contours;

iii. The names of undersea features and their co-ordinates used on the GEBCO (5th Edition), taken from the GEBCO Gazetteer (publication BP-0008) but supplemented and modified by later decisions of the GEBCO Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features;

iv. Textual information crediting the sources of the data.

11. PREPARATION OF A REVISED EDITION OF SHEET 5.12 (SOUTH ATLANTIC)

83 Peter Hunter (GBE) presented his final draft of this sheet to the Guiding Committee for approval. He reported that all modifications to the contours required by the reviewers, Sir Anthony Laughton and Professor Roger C.Searle, had been incorporated and the compilation was now complete. The material had been passed to the GDA Manager for incorporation into the GDA.

84 The Guiding Committee studied the sheet and also considered the names review that had been carried out by the Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features; they made a number of decisions concerning the names which have, with the agreement of members of the Sub-Committee present, been incorporated into the final Summary Report of its tenth meeting (doc. IOC-IHO/GEBCO SCGN-X/3).

85 The names review had also thrown up a few small amendments to the contours, and in addition Gleb Udintsev offered to provide some new material for the equatorial part of the sheet. The sheet was approved subject to a deadline of mid-June for receipt of any additional data, after which the material would be despatched to the Canadian Hydrographic Service for printing.

86 [Note: This deadline has been adhered to.]

12. 'GUIDELINES FOR THE GEBCO' (BP-0007)

87 Brian Harper tabled his 3rd Draft (April 1993) of Part 2B Bathymetric Data Management - Digital Data, which had been studied in detail and amended slightly by the Sub-Committee on Digital Bathymetry. A few further modifications were made by the Guiding Committee which then approved the final text for publication.

Michel Huet reported that the present state of production is as follows: 88

Part 1 GEBCO Organizational Framework Approved and published in English September 1991. French version published April 1992.

Part 2A Bathymetric Data Management - Analogue Data Approved and published in English September 1991. French version published April 1992.

Part 2B Bathymetric Data Management - Digital Data Approved at the current session (paragraph 87 above). This section will be published in English and French as soon as feasible.

Part 3 Digital Bathymetric Data (Single-Beam Echo Sounders) Approved and published in English March 1992. The French version is now ready and will be distributed shortly.

Part 4 Digital Bathymetric Data (MultiBeam Echo Sounders) Preliminary work on this part will be undertaken during the forthcoming intersessional period (see paragraph 53 above), with a view to presenting a first draft to SCDB-XI in May 1994.

Part 5 Underway Geophysics Data Approved and published in English March 1992. The French version is now ready and will be distributed shortly.

In addition a number of change pages have been issued on occasion. 89

13. PROPOSED SURVEYS IN THE ARCTIC

Gleb Udintsev reported that, following proposals made in Leningrad in June 1991 by Norman Cherkis and John Hall, he and Yuri Kiselev had investigated the feasibility of using a Russian nuclear submarine - Victor 3 (torpedo type) or Delta 1 or 2 (missile type) - for a survey of the Arctic Ocean. HDNO were interested but could not undertake this by themselves owing to budgetary constraints. 90

The Commander-in-Chief of the Russian Navy had agreed in principle to the proposal and had confirmed his willingness to provide a suitable submarine. The SeaBeam Corporation will provide a SeaBeam 2100 swath mapping system which will provide variable cover at different operating depths using different frequencies. Other equipment including a streamer will also be fitted. The U.S.Navy and USGS have agreed to provide financial support - Alan Cooper (USGS) is the main co-ordinator of the project, with Gleb Udintsev and Dale Perry (BSE Corporation/ SeaBeam Instruments). U.S. Vice-President Al Gore is said to be enthusiastic about the project. Canada and Germany may possibly be willing to provide some support. 91

92 The initial plan is to fit the equipment in late-summer 1993 and carry out a test cruise during the winter 1993/94. The survey could then start in 1994 with 4 one-month cruises a year for three seasons. 12 one-month cruises are considered to be the minimum that would be necessary; 15 such cruises would be preferable.

93 The cost of the project has been estimated at $10 million per year, to be shared roughly as follows:

Russian Navy	50%;
SeaBeam Company	35%
US Navy and Scientific interests	15%.

94 Three copies of the data would be made available to:

Russian Academy of Sciences;
HDNO;
USGS.

The bathymetry data would be released to GEBCO.

95 The most important issues were seen to be:

1. Radiation Safety;
2. Source Level of the Equipment;
3. Access to the Data.

96 It was noted that other interested persons were:

Leonard Johnson, US Office of Naval Research (a Scientific Adviser to the GEBCO) who is Chairman of the International Arctic Science Committee (IASC) Working Group for Marine Geology. This group also includes bathymetry as part of its remit.

Ron Macnab, Geological Survey of Canada, who is Chairman of the IASC Working Group for Geophysical Compilation and Mapping, which includes bathymetry among its themes.

Larry Mayer, OMG, University of New Brunswick, Canada (see item 14.5 below), is the North American co-ordinator for ARCTIC 95, a five ship experiment; and

Jørn Thiede, GEOMAR, Kiel, Germany, is the European co-ordinator. This experiment is expected to develop studies in several disciplines, including geology, geophysics, physical and chemical oceanography. A meeting of this group is scheduled to be held in Stockholm on 14 June 1993.

David Monahan and Evgeniy Shchaulov (GEBCO Arctic Reviewers).

14. SALES, PUBLICITY AND LIAISON WITH OTHER MAPPING ORGANISATIONS

14.1 Substance of a New Display to Publicise the GDA

97 The Guiding Committee was aware that the poster displays prepared some years ago had so deteriorated that they could no longer be used.

The importance of further publicity for the GEBCO was recognized and it was agreed that the whole GEBCO project, including revised Sheet 5.12, should be given wide publicity later in the year to coincide with release of the CD-ROM (item 10.5 above). *98*

The following actions were agreed: *99*

BODC would prepare a colour brochure, and advertisements would be placed in journals such as EOS (ref: doc.IOC-IHO/GEBCO Officers-VIII/3 paragraph 75) (Jones);

BODC will discuss with Larry Mayer (OMG - item 14.5 below) the possibility of developing a short video for presentation at scientific conferences, which would include DTM transformation from GEBCO material, as well as other swath mapping and imaging systems (Jones);

A half-page article would be published in the I.H.Bulletin, under 'New Products' (Andreasen);

Enquiries would be made with the IHB contact in the TV Centre in Monaco about the provision of a publicity item (with logos) which would be distributed to TV stations worldwide (Andreasen).

14.2 Liaison with the National Geographic Society (NGS)

Christian Andreasen agreed to approach the National Geographic Society to solicit their help, and enquire about the possibility of their publishing a short article on the 'History of Ocean Mapping', with emphasis on the GEBCO. It was recalled that Charles Case (of NGS) had already been in contact with Meirion Jones regarding their use of GEBCO material (ref: IOC-IHO/GEBCO-XIII/3, item 12.1). *100*

14.3 Liaison with the Institut Géographique National (IGN)

Further contact will be made with the Directeur Général Adjoint, IGN, M. Michel Louis, including an enquiry about the availability of digitized topography from the Carte générale du monde (CGM). *101*

14.4 Liaison with the IUGS Circum-Atlantic Project (CAP)

There was little to report. Meirion Jones is in contact with Terence Edgar regarding the provision of the GDA as the base bathymetry for this project. CAP have been awaiting material for the South Atlantic (revised sheet 5.12 - item 11 above) which will now be provided. *102*

14.5 Liaison with the Ocean Mapping Group (OMG), University of New Brunswick, Canada

Dr Larry Mayer, holder of the Industrial Research Chair in Ocean Mapping, University of New Brunswick, spoke about the activities of *103*

his group which had now been in existence for a little less than two years.

104 He explained that the group's research programme consisted basically of developing a suite of software tools to improve the data processing of modern swath/imagery bathymetric mapping systems. Such tools co-register bathymetric datasets and differential navigation systems to produce a seamless image single dataset. In addition Quality Control tools for application to all swath mapping systems were being developed to ascertain how accurately swath mapping systems measure depth.

105 The Bay of Fundy, with its tidal range of up to 16 metres, had proved an ideal test bed for the group's hydrographic ground truthing experiments.

106 Larry Mayer stressed that his group were not collectors of data, but were very efficient at processing algorithms and developing software. They could assist GEBCO by demonstrating new processing and visualization techniques on particular datasets of geological/ geophysical significance, but not on a routine basis.

107 It was agreed that there was considerable potential for collaboration between GEBCO and OMG, and that this would be of great help to BODC with the identification and understanding of new techniques. Links with OMG were seen to be so valuable that Larry Mayer was invited to become a Scientific Adviser to the GEBCO, a position which he accepted.

15. DATES AND PLACES OF THE NINTH MEETING OF THE GEBCO OFFICERS, THE FIFTEENTH SESSION OF THE JOINT GUIDING COMMITTEE, AND THE SUB-COMMITTEES

108 The Sub-Committee on Digital Bathymetry had proposed that their next meeting should be held at the University of New Brunswick, Fredericton, Canada, in the third week of May 1994. The Guiding Committee accepted this arrangement and decided that the GEBCO Officers should, if the necessary invitations were forthcoming, meet immediately after the Sub-Committee, either at the University of New Brunswick, or in the offices of the Canadian Hydrographic Service, Ottawa. Tentative dates are as follows:

GEBCO SCDB-XI	25-27 May 1994;
GEBCO Officers-IX	30 May-1 June 1994.

109 It was proposed that GEBCO-XV, GEBCO SCDB-XII and GEBCO SCUFN-XI be held at the International Hydrographic Bureau in May/June 1995. The Representative of the IHB confirmed that the Bureau would be pleased to host these meetings, but warned that the dates might clash with the move of the IHB to new premises on the western side of the harbour.

16. ANY OTHER BUSINESS

16.1 Project 'Global Mapping for the Global Environment'

The Representative of the IHO reported that at the Fifth United Nations Regional Cartographic Conference for the Americas, New York, 11-15 January 1993, which he had attended, a paper 'Global Mapping for the Global Environment' had been presented by Dr Hiroshi Murakami, Deputy Director, International Affairs Division, Economic Affairs Bureau of the Japanese Ministry of Construction. The proposal is for the development of a global Geographic Information System which would begin at a scale of 1:1 million and progress to larger scales, but it completely ignores the oceans which are clearly an important aspect of the global environment and are critical to global climate. He suggested that it might be appropriate to incorporate the GDA in this project. *110*

A colour brochure 'Global Mapping to save the Earth' issued by the Ministry of Construction, shows that this is a joint project of the International Affairs Division, Economic Affairs Bureau and the Geographical Survey Institute, both of the Ministry of Construction. It was noted that none of the maps reproduced in this brochure depict any ocean data. *111*

The Guiding Committee invited Kunio Yashima to contact Dr Murakami, to bring the GEBCO project to his notice, and to report back, through the Permanent Secretary, the outcome of his discussions, the views of the Ministry and any progress that has been made with implementation of the project. *112*

16.2 Resignation of Dr Robert L.Fisher

Dr Robert L.Fisher announced his intention of resigning from membership of the Guiding Committee. *113*

The Chairman accepted his resignation with considerable regret and expressed his, and the Guiding Committee's, grateful thanks to him for his many years of service to the GEBCO project. He greatly appreciated Dr Fisher's assurance that he would stand by his pledge to make his greater Indian Ocean work available to the GEBCO (see paragraphs 71-74 above) and that he would remain as Chairman of the Sub-Committee on Undersea Feature Names. *114*

17. APPROVAL OF THE SUMMARY REPORT OF THE SESSION

This Summary Report has been approved by correspondence. *115*

18. CLOSURE OF THE SESSION

The Chairman closed the Session at 17.00 on Thursday 6 May 1993, and in so doing thanked Dr Robert L.Fisher and his colleagues, and through him the SIO hierarchy, for their hospitality and the support that had been provided for the GEBCO Guiding Committee Session and for the two Sub-Committee meetings. This had been greatly appreciated. *116*

ANNEX I

AGENDA

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

4. MATTERS ARISING FROM REPORTS OF PREVIOUS MEETINGS

   4.1 Summary Report of the Thirteenth Session of the Joint IOC-IHO Guiding Committee for the GEBCO (doc. IOC-IHO/GEBCO-XIII/3)

   4.2 Short Summary Record of Discussion of the Eighth Meeting of the GEBCO Officers (doc. IOC-IHO/GEBCO Officers-VIII/3)

5. REVISED TERMS OF REFERENCE FOR THE GUIDING COMMITTEE

6. REPORT OF THE IOC CONSULTATIVE GROUP ON OCEAN MAPPING (CGOM) TO THE SEVENTEENTH SESSION OF THE IOC ASSEMBLY, PARIS, 25 FEBRUARY - 11 MARCH 1993 (doc. IOC/INF-899)

7. MID-CONTRACT REPORTS ON WORK CARRIED OUT BY, AND ACTIVITIES OF:

   7.1 THE GEBCO BATHYMETRIC EDITOR

   7.2 THE GEBCO DIGITAL ATLAS MANAGER

   7.3 THE NERC UNIT FOR THEMATIC INFORMATION SYSTEMS (NUTIS) - GEBCO PROJECT

8. SUB-COMMITTEE ON GEOGRAPHICAL NAMES AND NOMENCLATURE OF OCEAN BOTTOM FEATURES

   8.1 Revised Terms of Reference for the Sub-Committee

   8.2 Liaison and Co-operation with the U.S. Board on Geographic Names/Advisory Committee on Undersea Features (BGN/ACUF)

   8.3 Standardization of Undersea Feature Names (BP-0006)

9. SUB-COMMITTEE ON DIGITAL BATHYMETRY

9.1 Revised Terms of Reference for the Sub-Committee

9.2 IHO Data Centre for Digital Bathymetry (DCDB)

9.3 Global Horizontal Reference System

10. GEBCO DIGITAL ATLAS (GDA)

10.1 Progress with the GEBCO Digital Atlas (GDA)

10.2 Global Network of Reviewers

10.3 Preparation of a Prioritized Work List for the GDA Manager

10.4 Procedures for Updating the GDA, incorporating a Reviewing Process

10.5 Electronic publishing of GEBCO Products

11. PREPARATION OF A REVISED EDITION OF SHEET 5.12 (SOUTH ATLANTIC)

12. 'GUIDELINES FOR THE GEBCO' (BP-0007)

13. PROPOSED SURVEYS IN THE ARCTIC

14. SALES, PUBLICITY AND LIAISON WITH OTHER MAPPING ORGANISATIONS

14.1 Substance of a new display to publicise the GDA

14.2 Liaison with the National Geographic Society (NGS)

14.3 Liaison with the Institut Géographique National (IGN)

14.4 Liaison with the IUGS Circum-Atlantic Project (CAP)

14.5 Liaison with the Ocean Mapping Group (OMG), University of New Brunswick, Canada

15. DATES AND PLACES OF THE NINTH MEETING OF THE GEBCO OFFICERS, THE FIFTEENTH SESSION OF THE JOINT GUIDING COMMITTEE, AND THE SUB-COMMITTEES

16. ANY OTHER BUSINESS

16.1 Project 'Global Mapping for the Global Environment'

16.2 Resignation of Dr Robert L.Fisher

17. APPROVAL OF THE SUMMARY REPORT OF THE SESSION

18. CLOSURE OF THE SESSION

ANNEX II

LIST OF DOCUMENTS *

IOC-IHO/GEBCO-XIV/1 prov.	Provisional Agenda
IOC-IHO/GEBCO-XIV/2	Annotated Provisional Agenda
IOC-IHO/GEBCO-XIV/3	Summary Report of the Session
IOC-IHO/GEBCO-XIV/4	List of Documents
IOC-IHO/GEBCO-XIV/5	Revised Terms of Reference for the Guiding Committee
IOC-IHO/GEBCO-XIV/6	Progress Report on British Oceanographic Data Centre (BODC) Support for the GEBCO Digital Atlas (GDA)
IOC-IHO/GEBCO-XIV/7 rev.	Interim Report by the GEBCO Bathymetric Editor, April 1990 to December 1992
IOC-IHO/GEBCO-XIV/8	GEBCO: NUTIS Contribution
IOC-IHO/GEBCO-XIII/3 (in English & French)	Summary Report of the thirteenth session of the GEBCO Guiding Committee, Leningrad, USSR, 10-12 June 1991
IOC-IHO/GEBCO Officers-VIII/3	Short Summary Record of Discussion at the eighth meeting of the GEBCO Officers, BODC, Bidston, United Kingdom, 13-15 April 1992
IOC-IHO/GEBCO SCGN-IX/3	Summary Report of the ninth meeting of the GEBCO Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features, Leningrad, USSR, 5-7 June 1991
IOC-IHO/GEBCO SCDB-IX/3	Summary Report of the ninth meeting of the GEBCO Sub-Committee on Digital Bathymetry, BODC, Bidston, United Kingdom, 8-10 April 1992

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

IOC/INF-899 Report of the Consultative Group on Ocean Mapping (CGOM) to the Seventeenth Session of the IOC Assembly (16 December 1992)

BP-0007 (in English & French) Guidelines for the General Bathymetric Chart of the Oceans
Part 1 GEBCO Organizational Framework
Part 2A Bathymetric Data Management - Analogue Data
Part 2B Bathymetric Data Management - Digital Data (3rd Draft E.only April 1993)
Part 3 Digital Bathymetric Data (Single-Beam Echo Sounders)
Part 5 Underway Geophysics Data

Extract from I.U.G.G. Chronicle No.215 (January/February 1993) Conference Recommendation on the IAG Geocentric Reference System (GRS 80), as embodied in the World Geodetic System 1984 (WGS 84)
(together with) A complementary draft recommendation prepared by the International Hydrographic Bureau (IHB).

GEBCO Personality List Revised 1 April 1993

----- Proposed revised Terms of Reference for the Sub-Committee on Digital Bathymetry (SCDB)

----- Proposed revised Terms of Reference for the GEBCO Sub-Committee on Undersea Feature Names (SCUFN)

ANNEX III

TERMS OF REFERENCE

A. Revised Terms of Reference for the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO)

The Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO) shall:

1. Guide the GEBCO project and make recommendations to the two parent organizations on the policy to be followed for the preparation and dissemination of that world series of contoured charts of the ocean floor and of the 'GEBCO Digital Atlas'.

2. Identify the needs of the various users of the bathymetry of the world's oceans, study the ways and means whereby these needs can be met, and implement actions found feasible which meet these needs.

3. Advise the International Hydrographic Organization (in its capacity as the World Data Centre for Bathymetry) on matters connected with the collection and exchange of bathymetric data, including the development of automatic data assimilation, archival, retrieval and distribution methods, soliciting the advice and assistance of the IOC Committee on International Oceanographic Data and Information Exchange (IODE), and others as necessary.

4. Stimulate the flow of data relevant to GEBCO by actively identifying sources of new data and encouraging release of data to appropriate data banks, with the object of ensuring that maximum available data are provided to the World Data Centre for Bathymetry and its IHO Data Centre for Digital Bathymetry.

5. Supervise the means of maintaining, further developing and routinely updating the 'GEBCO Digital Atlas' (GDA) by:

   i. organizing procedures for new compilations of bathymetry;

   ii. advising on standards and methodology;

   iii. generating and developing a supplementary file containing shiptracks, for the purpose of providing graphic presentation for quality assurance related to interpreted bathymetric information;

   iv. integrating in an appropriate way the geographical names of undersea features;

and

v. considering the best medium and software for the effective use of the GDA by all users.

6. Explore the potential, for the better interpretation of oceanic bathymetry, of techniques such as acoustic imagery and satellite observations.

7. Taking into account the new technologies and data available, draft specifications and a timetable for the production of a 6th Edition of the traditional printed GEBCO chart series.

8. Investigate and develop new extrabudgetary logistic and financial arrangements necessary for the production of a 6th Edition of GEBCO.

9. Prepare and maintain, in association with national and international bodies, an authoritative Gazetteer of Geographical Names of Undersea Features.

10. Recommend and develop measures for optimum publicity, distribution and sales of copies of the 'GEBCO Digital Atlas' and printed charts produced under the aegis of the Guiding Committee.

11. Maintain, as necessary, advisory Sub-Committees on:
i. Undersea Feature Names;
ii. Digital Bathymetry.
and create others as required from time to time.

12. Advise regional bodies affiliated to IOC and/or IHO of the specifications for, and collaborate in the preparation of, bathymetric charts at scales suitable for regional projects, to help ensure their compatibility with, and later inclusion in, the GDA.

13. Provide advice on ocean mapping, as requested by intergovernmental and non-governmental organizations.

B. Revised Terms of Reference for the GEBCO Sub-Committee on Undersea Feature Names (SCUFN) Adopted May 1993

1. The Sub-Committee on Undersea Feature Names reports to the Guiding Committee as its designated authority for all matters concerning undersea feature names.

2. It is the function of the Sub-Committee to select those names appropriate for use on GEBCO graphical and digital products, on the IHO small-scale INTernational chart series, and on the IOC regional International Bathymetric Chart series.

3. The Sub-Committee shall:

3.1 select undersea feature names on the basis of
- i. undersea feature names provided by national and international organizations concerned with nomenclature;
- ii. names submitted to the Sub-Committee by individuals, agencies and organizations involved in marine research, hydrography, etc.
- iii. names appearing in scientific journals or on appropriate charts and maps, with valid supporting evidence.

Such names will be reviewed before they are inputted into the gazetteer.

3.2 define when appropriate the extent of named features.

3.3 provide advice to individuals and appropriate authorities on the selection of undersea feature names in international waters and, on request, in waters under national jurisdiction.

3.4 encourage the establishment of national boards of geographic names of undersea features, and when such a board does not exist for a given coastal state, co-operate in the naming of seafloor features related to those national waters.

3.5 prepare and maintain international gazetteers and supplements of undersea feature names.

3.6 encourage the use of undersea feature names shown on the GEBCO products on other maps, charts and scientific publications & documents, by promulgating them widely.

3.7 prepare and maintain internationally agreed guidelines for the standardization of undersea feature names, and encourage their use.

3.8 review and assess the need for revised or additional terms and definitions for submarine topographic features.

3.9 maintain close liaison with the UN Group of Experts on Geographic Names, and international or national authorities concerned with the naming of undersea features.

C. **Revised Terms of Reference for the GEBCO Sub-Committee on Digital Bathymetry (Adopted May 1993)**

The Sub-Committee on Digital Bathymetry shall:

1. maintain a watching brief on developments in deep sea bathymetric mapping and related activities, and on the evolving technologies used to support such work.

2. keep under review, and provide advice on, standards and procedures for ensuring the continued and effective management, availability and depiction of digital bathymetric data.

3. maintain, routinely update and further improve the 'GEBCO Digital Atlas' (GDA) by:
   i. developing procedures for incorporating new compilations of bathymetry;
   ii. advising on standards and methodology;
   iii. generating and developing a supplementary file containing shiptracks, for the purpose of providing graphic presentation for quality assurance related to interpreted bathymetric information;
   iv. integrating in an appropriate way the geographical names of undersea features; and
   v. investigating the best medium and software for the effective use of the GDA by all users.

4. explore the potential, for the better interpretation of oceanic bathymetry, of techniques such as acoustic imagery and satellite observations which do not produce precise sounding data.

5. investigate and recommend ways and means by which digital methods may be used to expedite production of the GEBCO (6th Edition).

6. advise, through the Guiding Committee, the International Hydrographic Organization (in its capacity as the World Data Centre for Bathymetry) on matters connected with the collection and exchange of bathymetric data, including the development of automatic assimilation, archival, retrieval and distribution methods, soliciting the advice and assistance of the IOC Committee on International Oceanographic Data and Information Exchange (IODE), and others as necessary.

7. stimulate the flow of data relevant to GEBCO by actively identifying sources of new data and encouraging release of data to appropriate data banks, with the object of ensuring that maximum available data are provided to the World Data Centre for Bathymetry and its IHO Data Centre for Digital Bathymetry.

8. interact with the IHO Committee on Exchange of Digital Data (CEDD) and with other relevant committees and working groups, to bring about, to the extent possible, uniformity and compatibility with IODE developments and also with IHO Classification Criteria for Deep Sea Soundings (IHO Special Publication No.44, Book 2).

ANNEX IV

RECOMMENDATION

GLOBAL HORIZONTAL REFERENCE SYSTEM

The Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO),

Recognizing the global nature of modern marine science programmes, e.g. global monitoring,

Recognizing also the need for accurate measurement and registration of various types of marine data,

Noting Recommendation 3 of Resolution 1 of the IUGG General Assembly, August 1991,

Noting also Recommendations 1 and 2 adopted at the First International Conference on Geodetic Aspects of the Law of the Sea, Denpasar, Bali, Indonesia, 8-13 June 1992,

Concurring with the view expressed by the above named meetings that there is a need for close co-operation between geodesists, hydrographers, oceanographers and lawyers to implement the provisions of the 1982 United Nations Convention on the Law of the Sea,

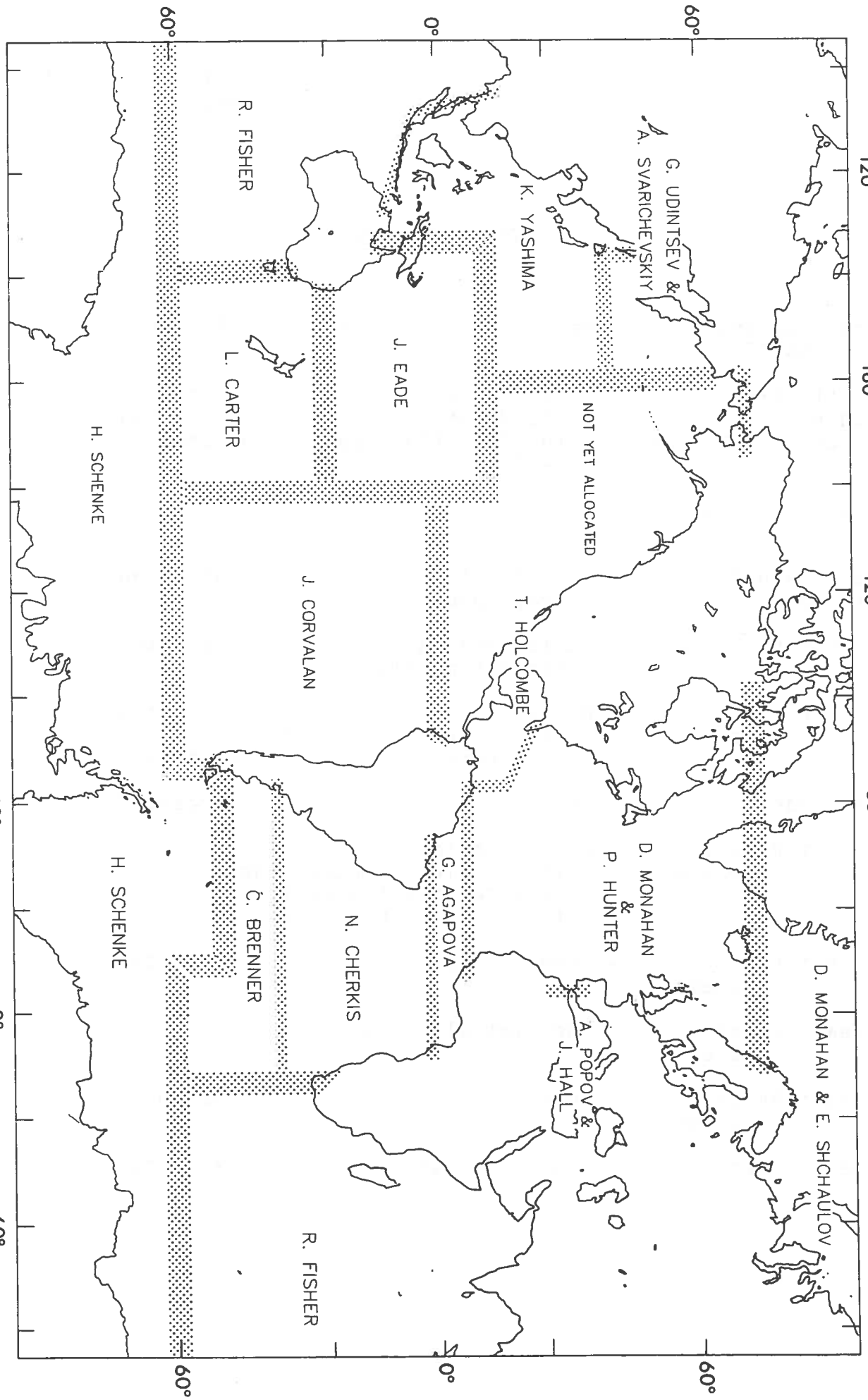
Being of the opinion that accurate positioning and the use of a common datum are of fundamental importance to global marine programmes such as the Joint IOC-IHO General Bathymetric Chart of the Oceans (GEBCO),

Calls upon IOC and IHO Member States to adopt, to the maximum extent possible, the IAG Geocentric Reference System (GRS 80), embodied in World Geodetic System 1984 (WGS 84), as the Global Horizontal Reference Datum for the positioning of scientific and hydrographic observations and the publication of results.

ANNEX V

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	Accepted
	David Monahan	Accepted
	(link to Galina Agapova for area 0°-7°N.)	
Caribbean Sea & Gulf of Mexico	Troy Holcombe	Accepted
Mediterranean & Black Seas	John K.Hall	Accepted
	Andrey Popov	Accepted
Arctic Ocean	David Monahan	Accepted
	Evgeniy Shchaulov	Accepted
South Atlantic Ocean	Norman Z.Cherkis	Accepted
	(link to Brazilians, also Carl Brenner and Robert L.Fisher)	
Indian Ocean	Robert L.Fisher	Accepted
North-west Pacific Ocean	Kunio Yashima	Accepted
	(link to Gleb Udintsev and Alexander Svarichevskiy for Sea of Okhotsk area)	
South-west Pacific Ocean	James V.Eade	Accepted
North-east Pacific Ocean	(not yet allocated)	
South-east Pacific Ocean	José Corvalan D.	Accepted
New Zealand waters	Lionel Carter	Accepted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G. UDINTSEV &
A. SVARICHEVSKIY
K. YASHIMA
R. FISHER
L. CARTER
J. EADE
NOT YET ALLOCATED
H. SCHENKE
J. CORVALAN
T. HOLCOMBE
D. MONAHAN
&
P. HUNTER
D. MONAHAN & E. SHCHAULOV
G. AGAPOVA
A. POPOV &
J. HALL
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ANNEX VI

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ANNEX VII

LIST OF ACRONYMS

ACUF	Advisory Committee on Undersea Features (of BGN)
AGSO	Australian Geological Survey Organization
AWI	Alfred-Wegener-Institut für Polar- und Meeresforschung (Bremerhaven, Germany)
BAS	British Antarctic Survey
BGN	Board on Geographic Names (USA)
BGS	British Geological Survey
BODC	British Oceanographic Data Centre (Bidston Observatory, Birkenhead, UK)
BSE	Business Science Exchange Corporation (USA)
BSH	Bundesamt für Seeschiffahrt und Hydrographie (Hamburg, Germany)
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)
CHS	Canadian Hydrographic Service
CMG	Commission for Marine Geology (IUGS)
COE	Committee on ECDIS (IHO)
DCDB	Data Centre for Digital Bathymetry (IHO - at NGDC, Boulder, Colorado, USA)
DMA	Defense Mapping Agency (USA)
DTM	Digital Terrain Model
EB	Editorial Board

ECDIS	Electronic Chart Display and Information System (IHO)
GAPA	International Geological/Geophysical Atlases of the Atlantic and Pacific Oceans (IOC)
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)
GPS	Global Positioning System
GRS	Geocentric Reference System (IAG)
HDNO	Head Department of Navigation & Oceanography (USSR Ministry of Defence, Leningrad)
IAG	International Association of Geodesy (IUGG)
IAPSO	International Association for the Physical Sciences of the Ocean (IUGG)
IASC	International Arctic Science Committee
IBC	International Bathymetric Chart (IOC)
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
ICSEM	International Commission for the Scientific Exploration of the Mediterranean Sea
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer

IGN	Institut géographique national (Paris, France)
IHB	International Hydrographic Bureau
IHO	International Hydrographic Organization
INEGI	Instituto Nacional de Estadística, Geografía e Informática (Mexico)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IODE	International Oceanographic Data and Information Exchange (IOC)
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
MSA	Maritime Safety Agency (Japan)
NERC	Natural Environment Research Council (Swindon, UK)
NGDC	National Geophysical Data Center (Boulder, Colorado, USA)
NGS	National Geographic Society (USA)
NIWAR	National Institute of Water & Atmospheric Research Ltd. (New Zealand)
NRL	Naval Research Laboratory (USA)
NUTIS	NERC Unit for Thematic Information Systems (NERC at Reading University, UK)
NZOI	New Zealand Oceanographic Institute (NIWAR)
OMG	Ocean Mapping Group (University of New Brunswick, Canada)
OPS	Oceanic Plotting Sheet (IHO)
ORMS	Off-shore Resource Map Series (Australia)
SCAR	Scientific Committee on Antarctic Research (ICSU)
SCDB	Sub-Committee on Digital Bathymetry (GEBCO)
SCGN	Sub-Committee on Geographical Names and Nomenclature of Ocean Bottom Features (GEBCO)
SCOR	Scientific Committee on Oceanic Research (ICSU)

SCUFN	Sub-Committee on Undersea Feature Names (GEBCO)
SIO	Scripps Institution of Oceanography (La Jolla, USA)
SOPAC	South Pacific Applied Geoscience Commission
USGS	United States Geological Survey
WG/OPS	Working Group on Oceanic Plotting Sheets (IHO)
WGS	World Geodetic System