INTERNATIONAL HYDROGRAPHIC BUREAU

BUREAU HYDROGRAPHIQUE INTERNATIONAL

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B.P.445 - MC 98011 MONACO Cedex
PRINCIPAUTE DE MONACO

Monaco, 18th June 2007.

Mr. Dave Monahan
Chairman of the GEBCO Guiding Committee
e-mail: monahand@ccom.unh.edu

SCUFN20-03A

Dear Dave,

As you are aware, the report of GEBCO submitted to the XVIIth International Hydrographic Conference last month was presented by Commander Lusiani, member of the GEBCO Guiding Committee, on your behalf.

A major component of the report was the revised Terms of Reference (ToR) for GEBCO and its two sub committees. The Conference was unable to approve the revised ToR as it considered that there were inconsistencies, which needed to be resolved, these principally concerned the composition, representation and length of service of Committee and Sub-Committee members. I attach a draft copy of the pertinent part of the Conference proceedings, reflecting the discussion which took place, for your information.

In addition to the points mentioned in the draft conference proceedings some further points were raised in separate discussions between delegates and IHB staff and I list these for your further information:

a. GGC RoP 1.2 and 2 - The need for the difference between 5 year and 4 year appointments is neither obvious nor justified.

b. SCUFN RoP 2.1.1 - If members are appointed by the parent organizations it is not appropriate to consider a further endorsement by the GGC.

c. SCUFN RoP 2.1.3 - The procedure seems cumbersome. One term with a second term is OK if decided by IHO and or IOC. It is not a matter for the GGC to decide which member will stand down.

d. TSCOM RoP 2.1.1 - Appointment should come from parent organizations not from the GGC, and in any case the Sub Committee should not appoint its own members. It can of course invite observers.

In view of the matters raised above it would be appreciated if the Guiding Committee could review the ToR in order that they can be re-submitted to Member States via an IHB Circular Letter, before 20 November 2007, and we can all move GEBCO forward. The IHB remains ready to provide any assistance that it can.

On behalf of the Directing Committee
Yours sincerely

Hugo GORZIGLIA
Captain Chilean Navy, Director

Annex A Draft IHC Comments
Annex B Report of the Joint IHO-IOC Guiding Committee for GEBCO
Copy to: All members of the GGC –
IOC (Dr. Dmitri Travin d.travin@unesco.org)
GEBCO Permanent Secretary Mr. Bob Whitmarsh: rbw@noc.soton.ac.uk

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

Commander LUSIANI (Italy), presenting the report on behalf of the Chairman of the GEBCO Guiding Committee, highlighted some recent developments with regard to GEBCO. A major event had been the celebration of the GEBCO centenary in 2003, with the publication of a history of GEBCO and a centenary edition of the GEBCO Digital Atlas. Another important activity had been the reorganization of the GEBCO website. In addition, in response to a request from the Secretariats of the IHO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the Terms of Reference and Rules of Procedure for the Guiding Committee and its two sub-committees, the Sub-Committee on Undersea Feature Names and the Sub-Committee on Ocean Mapping (formerly the Sub-Committee on Digital Bathymetry) had been rewritten. The Conference was asked to endorse the new texts, set out in Annexes A, B and C to the report (CONF.17/WP.3). The Conference was also asked to urge IHO Member States to contribute actively to GEBCO by encouraging, supporting and facilitating the submission of bathymetric data. Other recommendations to the Conference appeared in paragraph 6 of the report.

IGA BESSERO (France) observed that the report featured some extremely complex texts which Member States had not had much time to study. There were several inconsistencies in the French version. It was proposed, for example, that the renewal of membership was to be decided by the members themselves, and that some members of the Sub-Committee on Ocean Mapping would be appointed by the Subcommittee itself. That was not the normal procedure for IHO bodies. He could not endorse the new Terms of Reference and Rules of Procedure as they stood. Nor was he convinced that recommendation 4, in paragraph 6 of the report, was well-founded; it was not sufficient merely to make available data from ENC files. The first step should be to define what need was to be met by extending GEBCO coverage to inshore areas, and then to consider how to meet it.

Dr. YEON (Republic of Korea) also noted several inconsistencies in the provisions for decision-making in the Rules of Procedure. He requested the GEBCO Guiding Committee to re-examine those provisions and report to Member States via Circular Letter.

The PRESIDENT suggested that the Terms of Reference and Rules of Procedure should be referred back to the GEBCO Guiding Committee for revision and subsequent reissue via Circular Letter.

Commander LUSIANI (Italy) said since the report was submitted, the Guiding Committee had itself noticed some inconsistencies, and was planning to review the Terms of Reference and Rules of Procedure at its next meeting in October 2007.

> The GEBCO report was referred back to the GEBCO Guiding Committee for revision and subsequent reissue via Circular Letter.

REPORT OF THE JOINT IHO-IOC GUIDING COMMITTEE FOR THE GENERAL BATHYMETRIC CHART OF THE OCEANS (GEBCO)
by the Chairman, Mr. David MONAHAN, Canada

1.	**Chairperson:**	Sir Anthony LAUGHTON (UK)	until April 2003
		Mr. David MONAHAN (Canada)	from April 2003
	Vice-Chairperson:	Mr. David MONAHAN Canada)	until April 2003
		Dr. Robin FALCONER (New Zealand)	from July 2005
	Secretary:	Mr. Brian HARPER (UK)	1997-2000
		Professor Bob WHITMARSH (UK)	from January 2001

2. Membership: IHO: Ing. gen. Etienne CAILLIAU (France) from 2003,
Dr. Chris FOX (USA) from July 2005,
Mr. Alexis HADJIANTONIOU (Greece) until May 2004),
Dr. Michael S. LOUGHRIDGE **(**USA) until January 2006,
Cdr. Paolo LUSIANI (Italy) from February 2005,
Mr. David MONAHAN (Canada**),**
Ing. gén. de l'armement Patrick SOUQUIERE **(**France) until 2002,
Dr. Kunio YASHIMA (Japan).

IOC: Dr. Robin FALCONER (New Zealand),
Lic. José Luis FRIAS SALAZAR (Mexico),
Dr. Martin JAKOBSSON (Sweden) from 2006),
Dr. Meirion JONES (UK; 2003) June 2006,
Sir Anthony LAUGHTON (UK) until April 2003,
Dr. Hans-Werner SCHENKE (Germany),
Dr. Nataliya TURKO (Russian Federation) from June 2006),
Dr. Gleb UDINTSEV (Russian Federation) until June 2006).

3. Meetings

2002
The 13th meeting of the GEBCO Officers was held in Durham, New Hampshire, USA in 20-21 May 2002.
Ref: Doc. IOC-IHO/GEBCO Officers XIII and Sub-Committee on Digital Bathymetry XIX.

The 19th meeting of the Sub-Committee on Digital Bathymetry was held in Durham, New Hampshire, USA in 16-17 May 2002. The report of this meeting was incorporated into the minutes of the GEBCO Officers (GEBCO Officers XIII).
Ref: Doc. IOC-IHO/GEBCO Officers XIII and Sub-Committee on Digital Bathymetry XIX.

The 15th meeting of the Sub-Committee on Undersea Feature Names was held in Monaco in 7-10 October 2002.
Ref: Doc. IOC-IHO/GEBCO SCUFN-XV/10

2003
The 19th meeting of the GEBCO Guiding Committee was held in Monaco in 16-17 April 2003.
Ref: Doc. IOC-IHO/GEBCO Guiding Committee XIX and Sub-Committee on Digital Bathymetry XX.

The 20th meeting of the Sub-Committee on Digital Bathymetry was held in Monaco in 12 April 2003. The report of this meeting was incorporated into the minutes of GEBCO Guiding Committee (GEBCO Guiding Committee XIX).
Ref: Doc. IOC-IHO/GEBCO Guiding Committee XIX and Sub-Committee on Digital Bathymetry XX.

The 16th meeting of the Sub-Committee on Undersea Feature Names was held in Monaco in 10-12 April 2003.
IOC-IHO/GEBCO SCUFN-XV1/3

2004
The 20th meeting of the GEBCO Guiding Committee was held in Portovenere, Italy in 1-6 April 2004.
Ref: Doc. IOC-IHO/GEBCO Guiding Committee XX.

The 17th meeting of the Sub-Committee on Undersea Feature Names was held in St Petersburg, Russian Federation in 8-11 June.
IOC-IHO/GEBCO SCUFN-XVII

2005
The 21st meeting of the GEBCO Guiding Committee was held in Aguascalientes, Mexico in 11-12 July 2005. The 22nd meeting of the GEBCO Guiding Committee was held in Durham, New Hampshire, USA in 3 December 2005.
Ref: Doc. IOC-IHO/GEBCO Guiding Committee XXI and Sub-Committee on Digital Bathymetry XXI.

The 21st meeting of the Sub-Committee on Digital Bathymetry was held in Aguascalientes, Mexico in 27-28 July 2005. The report of this meeting was incorporated into the minutes of GEBCO Guiding Committee (GEBCO Guiding Committee XXI).
Ref: Doc. IOC-IHO/GEBCO Guiding Committee XXI and Sub-Committee on Digital Bathymetry XXI.

The 18th meeting of the Sub-Committee on Undersea Feature Names was held in Monaco in 3-6 October 2005.
IOC-IHO/GEBCO SCUFN-XVIII/3

2006
The 23rd meeting of the GEBCO Guiding Committee was held in Bremerhaven, Germany in 19-20 June 2006.
Ref: Doc. IOC-IHO/GEBCO Guiding Committee XXIII and Sub-Committee on Digital Bathymetry XXII.

The 22nd meeting of the Sub-Committee on Digital Bathymetry was held in Bremerhaven, Germany in 14-16 June 2006. The report of this meeting was incorporated into the minutes of GEBCO Guiding Committee (GEBCO-XXII).
Ref: Doc. IOC-IHO/GEBCO Guiding Committee XXIII and Sub-Committee on Digital Bathymetry XXII.

The 19th meeting of the Sub-Committee on Undersea Feature Names was held in Bremerhaven, Germany in 21-23 June 2006.

2007
The 24th meeting of the GEBCO Guiding Committee is planned to be held at the Lamont-Doherty Geological Observatory, New York, USA in September 2007.

The 20th meeting of the Sub-Committee on Undersea Feature Names is planned to be held in Monaco in 9-13 July 2007.

SUB-COMMITTEE ON DIGITAL BATHYMETRY (SCDB)

1. Chairman: Dr. Meirion T. JONES (UK; until April 2003)
Dr. Walter SMITH (USA; from April 2004)

Secretary: Professor Bob WHITMARSH

2. Members: Dr Michael Carron, Mr Norman Z. Cherkis, Dr Andrew Goodwillie, Mr Alexis E. Hadjiantoniou, Dr John K. Hall, Mr Peter Hunter (until December 2005), Dr Michael S. Loughridge, Mr Ron Macnab, Dr Andrey Popov, Mr William Rankin, Dr -Ing. Hans-Werner Schenke, Dr George Sharman, Dr. Walter Smith (from May 2002), Mr Shin Tani.

SUB-COMMITTEE ON UNDERSEA FEATURE NAMES (SCUFN)

1. Chairman: Dr. Robert L. FISHER (USA; until April 2003)
Dr. Hans-Werner SCHENKE (Germany; from April 2003)

Secretary: Ing. en chef M. HUET (IHB)

2. Members: Dr Galina Agapova, Lt. Cdr Harvinder Avtar (from July 2005), Mr Norman Z. Cherkis (from April 2003), Dr Robin K.H. Falconer (until October 2002), Lic. José Luis FRIAS Salazar (from July 2005), Rear Admiral Neil Guy (until May 2002), Dr Hyun-Chul HAN (from June 2006), Dr Kunikazu Nishizawa (April 2003 – 2005), Dr Yasuhiko Ohara (from July 2005), L. Cdr. Rafael PONCE Urbina (from July 2005), Lic. W. Reynoso (from June 2006), Mr Desmond P D Scott (until 2003), Capt Vadim Sobolev (from April 2003), Mrs Lisa Taylor (from April 2003), Capt. Albert E. Theberge (from July 2005), Dr Kunio Yashima (until 2003).

4. Agenda Items

GEBCO is a project that is open to all those interested in mapping the ocean floor. It relies largely on the voluntary efforts of an international collaborating community of scientists and hydrographers with the support of the IHO and the IOC. Because of its voluntary nature progress may at times seem sporadic but readers of this report will learn that GEBCO has made substantial progress on many fronts in the last five years.

4.1 GEBCO Centenary

GEBCO celebrated its Centenary in 2003. The Centenary Commemoration, which was jointly organized by GEBCO, the IHO and the IOC with a contribution from the Government of Monaco, was held in Monaco on 14-16 April 2003. It was a complete success in no small part due to the efforts of GEBCO's Centenary Organising Committee chaired by Dr Loughridge. GEBCO is also greatly indebted to the staff of the International Hydrographic Bureau for their efforts in providing the local organisation of the event.

The main component of the event was the Conference "*Charting the Secret World of the Ocean Floor. The GEBCO Project 1903-2003*", which brought together a selection of very interesting papers on subjects ranging from the early years to the future of GEBCO, with special emphasis on Ocean Mapping in the 21st Century. These papers were subsequently published on CD-ROM. The Conference was attended by more than 150 specialists who were impressed by the high quality of the presentations, including 3-D dynamic pictures of the seabed and other state-of-the-art developments in digital bathymetry. Associated events were:

- The publication of a 140-page book "*The History of GEBCO, 1903-2003"*, with numerous colour plates, published by GITC bv.

- The publication of the Centenary Edition of the GEBCO Digital Atlas which includes a gridded version of GEBCO contours and terrestrial relief presented on a one minute (latitude by longitude) global grid. A copy was distributed to Conference participants.
- A technical ocean mapping exhibition, which included the first bathymetric map of the whole Indian Ocean, generated from gridded data, and bathymetric products of several International Bathymetric Chart (IBC) projects.

- The unveiling of a commemorative plaque by H.S.H. Prince ALBERT of Monaco during the Opening Ceremony.

4.2 GEBCO Products

During the Centenary Conference in 2003 the new 1-minute gridded Centenary Edition of the GDA (referred to as the GDA-CE) was released. This represented the culmination of strenuous efforts by many people within GEBCO to meet a tight deadline. The software interface of the new GDA exhibits great flexibility in the types of displays that can be created and in addition can be used to create profiles of relief, to plan cruise tracks and to enquire about feature and place names. In December 2002, at the Fall meeting of the American Geophysical Union in San Francisco, 400 people visited a booth run by GEBCO. In April 2003, the new GDA was shown to a similar number of people attending the European Geophysical Assembly in Nice, France.

Subsequently in February 2004 a system was set up to allow users to access 20x20 degree tiles of bathymetry from the GDA-CE over the internet. This rapidly proved to be very popular. An upgraded version of the GDA-CE is now (October 2006) available with an improved software interface. In June 2006 the GDA grid was also made freely available for downloading from the GEBCO web site (www.gebco.net).

Cumulative Sales and Distribution of the GDA-CE up to May 2006 were 994 copies distributed to 82 countries (of which 553 were sold including 167 in the year to May 2006).

A small group has used the GDA-CE as the basis for a new, poster-sized, World Map of ocean bathymetry and land images intended to be printed at 1:35 million scale. The map, ten thousand copies of which will be printed in late 2006, is designed primarily for educational use. It will also be accessible over the internet.

4.3 GEBCO Web Site

The Web site was re-organised in 2003-2004 under a contract with Dr Goodwillie and continues to be a useful source of information about GEBCO for the community. In 2005, through the good offices of Mr John von Rosenberg, a new URL address was obtained at www.gebco.net. This URL, which is easier to remember than that of the actual physical host at

NGDC (http://www.ngdc.noaa.gov/mgg/gebco/gebco.html), immediately forwards all clients to the NGDC site. GEBCO is indebted to NGDC for continuing to host this site. A recent survey (2006) has shown that the GEBCO web site is experiencing an increasing number of hits per month.

4.4 GEBCO Officers and Guiding Committee meetings

In May 2002 it was agreed that henceforth the Guiding Committee should meet every year rather than holding just Officers meetings in alternate years.

In April 2003 Sir Anthony Laughton resigned from the Chairmanship of GEBCO. The Guiding Committee gratefully acknowledged his great contribution to GEBCO over many years. Mr David Monahan took over as chair.

4.5 Undersea Feature Names

In April 2003, Dr. R.L. Fisher resigned from the Sub-Committee on Undersea Feature Names (SCUFN) after more than 20 years of authoritative leadership of the committee and a huge contribution to GEBCO.

Dr. H.W. Schenke took over the Chairmanship of SCUFN from Dr Fisher. The committee has expanded its membership and increased its activities in the quinquennial period. The Sub-Committee has a high workload caused by an increase in proposed names for undersea features. The Committee is continuing to harmonise its own and the US Board on Geographic Names Advisory Committee on Undersea Features' (ACUF's) Gazetteers of undersea feature names. The GEBCO Gazetteer of Undersea Feature Names can now be downloaded from the GEBCO web site. An electronic form, also accessible from the web site, has also been devised to make it easier to propose names to the committee. Now this can even be done at sea during a research cruise or hydrographic survey!

4.6 Technical Issues

The Sub-Committee on Digital Bathymetry reached a critical moment in April 2003 when Dr Meirion Jones, its Chairman, retired after 20 years in post. Considerable discussion followed on the need for, and aims of, any successor committee and there was a hiatus until 2005. Eventually Dr Walter Smith was invited and agreed to be Chairman in April 2004 and the committee decided on a more appropriate name to reflect its aims and activities, the Technical Sub-Committee, in June 2006. During the interregnum (2003-2004) two Working Groups had considered how best to assimilate and acquire data for the IHO DCDB and how to integrate geoscientific data, such as satellite altimetry, into GEBCO products. It was decided to abandon the idea of concurrently maintaining a contour-based grid and a soundings-based grid in favour of the latter.

The principal technical issues at stake now are how to combine soundings with multibeam data and how to incorporate gridded data presented at different grid intervals. It is also important to devise ways to assimilate data more rapidly than in the past and to make the updated data sets widely available.

4.7 Regional and Global Mapping

Members of the GEBCO community have been instrumental in initiating one new Regional Mapping project in the quinquennial period. This is the International Bathymetric Chart of the Southern Ocean (IBCSO) which was first mooted at the GEBCO meeting in 2002. The International Bathymetric Chart of the Arctic Ocean (IBCAO) and the International Bathymetric Chart of the Mediterranean (IBCM) are also being updated and GEBCO has also been actively involved in the production of the International Bathymetric Chart of the

Caribbean (IBCCA) which is well advanced. Two other Regional Mapping projects are being planned in the North Atlantic and Indian Oceans. The Guiding Committee has accepted that, given the limited resources available, carrying out regional mapping projects of particular seas or geographic units is one achievable step that contributes to mapping the global ocean.
On the other hand it has also been recognised that to make progress on a global scale it is necessary to solve the problems of how to ingest new gridded data sets, down to a 0.1' grid interval, and how to merge 'depths' computed from satellite altimetry with sounding observations. GEBCO is tackling such problems in parallel with regional mapping.

A new World Map based on the GDA-CE has also been produced (see Section 4.2).

There are recurring problems with accessing data sets collected by individual scientists, government agencies and military organisations. Often these data can eventually be obtained, even if in decimated form, but each case needs a separate approach and sometimes success is achieved only through personal contact. This is very time consuming.

4.8 Collaboration

To encourage closer co-operation with IOC's Consultative Group on Ocean Mapping (CGOM) and IOC's Ocean Mapping projects joint sessions were held with CGOM in April 2003 in Monaco and June 2006 in Bremerhaven, Germany. GEBCO has always been happy to work with the groups producing IBCs. It intends to work with CGOM with a view to better formalising the relationship between GEBCO and CGOM for the benefit of ocean mapping.

4.9 IHO Data Center for Digital Bathymetry

The IHO Data Center for Digital Bathymetry has been very active during the quinquennium and continues to supply substantial amounts of data for GEBCO products. A separate report is provided elsewhere.

4.10 The role of the VHOs

The greatest contribution that VHOs can make to GEBCO and its products is in the donation of shallow-water soundings and data culled from electronic and digital navigational charts. A questionnaire was circulated in 1996 by the IHB (Circular Letter 20/2006) to VHOs requesting that such data be made available. The response was generally disappointing although 14 countries had replied positively.

However, more recently, as was reported at the 2006 GEBCO meeting Bremerhaven, the IHB has had considerable success in obtaining shallow-water data from the electronic and digital navigational charts of eight VHOs and these data are now being incorporated into GEBCO databases.

4.11 Impact of UNCLOS surveys

Many coastal states have until 13th May 2009 to submit their claims to an offshore legal 'continental shelf' under Article 76 of the UN Law of the Sea (UNCLOS). To support such claims bathymetric surveys have been carried out over many continental shelf and margin areas and it is hoped that many of these data will enter the public domain, and hence be accessible to GEBCO, after each claim has been examined by the UN Commission on the Limits of the Continental Shelf.

4.12 Tsunamis

The devastating Asian tsunami of December 2004 made the importance of ocean bathymetry painfully apparent. Ocean bathymetry, and more finely gridded, shallow-water, coastal surveys in particular, are vital to model and predict the timing of arrival and the amplitude of run-up in coastal areas. Ocean bathymetry is particularly important for identifying isolated and relatively shallow-topped seamounts which influence the direction taken by tsunamis as they propagate across oceanic basins. Since December 2004 GEBCO has begun to work more closely with key members of the tsunami modelling community while recognising that its main focus must remain in the deeper ocean areas.

GEBCO is also becoming involved in the intergovernmental *ad hoc* Group on Earth Observations (GEO) organisation which was set up by G8 Ministers to coordinate efforts in response to the Asian tsunami. It has been gratifying to note that bathymetry has been recognised as an important component of the efforts of the Global Earth Observation System of Systems (GEOSS) which aims to create data bases of satellite and remotely sensed data.

4.13 SSPARR Buoys

In 2003 Mr. Anderson and others submitted a proposal to the USA National Science Foundation to acquire soundings from free floating buoys that transmitted their data back to shore via satellite. The objective was to acquire bathymetric data from poorly surveyed oceanic areas and from floating ice in the Arctic Ocean. The proposal was eventually funded and following sea trials in October 2004 the first buoys are planned to be deployed in the Arctic in the near future.

4.14 Bathymetric Editor

Mr. P.M. Hunter, who had been GEBCO's Bathymetric Editor for some 17 years, resigned in late 2005 to enable him to broaden his career. Mr C.L. Jacobs, also from the National Oceanography Centre, Southampton, UK, took over as GEBCO's Bathymetric Editor in January 2006. GEBCO remains very grateful to the UK's Natural Environment Research Council for continuing to provide support of the Editor.

4.15 IHO Guidelines

An updated edition of the IHO-IOC Publication B-7 "GEBCO Guidelines" was produced in April 2003. This edition includes improvements to Chapter 2 "Bathymetric Data Management" and Chapter 4 "Multibeam Echo Sounders", as well as Annex 2 "Specifications for International Bathymetric Charts (IBC) produced under IOC's Regional Ocean Mapping Projects".

4.16 GEBCO Strategic Plan

Version 3.1 of a draft Strategic Plan for GEBCO was produced in May 2002 and developed subsequently at GEBCO's annual meetings up to July 2005. A Strategy Planning Committee, which had met for the first time in 2001, was disbanded in April 2004.

4.17 The future funding of GEBCO

The future funding of GEBCO continues to be a concern. GEBCO's sole source of regular cash income is from a half-share in the sale of the GDA-CE on CD ROMs. Other substantial support, either in kind or in funds, has been provided by the IHO Secretariat, the IOC Secretariat (until 2005) and by the UK Natural Environment Research Council all of which is gratefully acknowledged. Occasional gifts from a private source are also highly appreciated and gratefully received. Almost all other resources are obtained by individuals donating their own time, and sometimes their own funds, to GEBCO.

Annex B

4.18 Nippon Foundation

Discussions at the 2002 GEBCO meeting identified the need for a new generation of ocean mappers as a key strategic issue. This lead to a successful major funding proposal to the Nippon Foundation in 2003. The project, which is called the Nippon Foundation/GEBCO Training Project, is focused on the development of human resources in ocean mapping. Initially an *ad hoc* Project Management Group, later (from July 2005) a Project Management Committee, chaired by Dr Robin Falconer, was set up. Within a few months, after inviting tenders to run the project, the Center for Coastal and Ocean Mapping/Joint Hydrographic Center of the University of New Hampshire, USA was awarded a contract to run a series of 12-month courses leading to a Postgraduate Certificate in Ocean Bathymetry. In mid-2004, after short listing and interviewing four candidates from among 31 applicants, Mr David Monahan was appointed as Project Manager based in Durham, New Hampshire and he took up his post in August 2004.

The first seven students started at the University in September 2004; coming from Japan, India, Fiji, Peru, Argentina, Nigeria and Kenya. The project continues to thrive. Five students started in September 2006 and six more in September 2006. By August 2007, 18 students from 12 countries will have been trained in ocean bathymetry. Negotiations are currently underway with the Nippon Foundation to define the form of the project after August 2007.

4.19 Reorganisation of Ocean Mapping and New Terms of Reference

In April 2004, at the annual GEBCO meeting, the IHO and IOC Secretariats proposed a structure for the re-organisation of Ocean Mapping that included GEBCO and the Ocean Mapping Programme of the IOC working under an Ocean Mapping Directing Board. This was strenuously and almost unanimously rejected by the GEBCO community because it was perceived to be ill-conceived and to take no account of the voluntary nature of the contributions made by the GEBCO community nor to show any understanding of the manner in which GEBCO operates. The only perceived advantage in the proposed structure was the attempt to ensure closer collaboration between GEBCO and those producing the International Bathymetric Charts (IBCs) of IOC. However it was also recognised that members of GEBCO were already involved in all the proactive IBCs and that the injection of GEBCO people into the less active IBCs was unlikely to bring them to life. Fruitless negotiations on the proposed restructuring took place subsequently upto 2006.

At last, in June 2006, it was agreed with the IHO and IOC Secretariats that GEBCO should rewrite the Terms of Reference of its Committees. This was long overdue and has been needed to meet changing circumstances and to increase GEBCO's flexibility of operation. It has been evident for some time that the Terms of Reference and Rules of Procedure of GEBCO's committees need to be revised to bring them in line with GEBCO's current practises and to provide a firmer and clearer framework within which the committees can operate. Therefore, after extensive discussions within the GEBCO Guiding Committee and the wider GEBCO community and discussions and dialogue with the Secretariats of IHO and IOC, new draft Terms of Reference and Rules of Procedure were produced separately for the Guiding Committee, the Technical Sub-Committee (formerly the Sub-Committee on Digital Bathymetry) and the Sub-Committee on Undersea Feature Names. These drafts are submitted as Annexes 1 to 3, respectively, to this report for approval by the Member States of the International Hydrographic Organization and the Intergovernmental Oceanographic Commission, the two parent organizations of the GEBCO Project.

5. Conclusions

The five years of the reporting period have produced many reasons to celebrate, as GEBCO did at its Centenary. The Centenary celebrations typified GEBCO's purposes: the bringing together of experts and administrators with the common aim of mapping the seafloor, and the distribution of the results of their efforts through the publication of maps, grids, books and technical papers. These continued throughout the reporting period with at least three meetings behind held each year, displays at conferences, upgrading of the digital atlas (GDA-CE) and its software interface, making the grid available for downloading from the GEBCO web site, distribution of 994 copies of the GDA to 82 countries (of which 553 were sold including 167 in the year to May 2006), the impending release of a new World Map of ocean bathymetry, re-organisation of the website, the growth of membership of the Sub-Committee on Undersea Feature Names, the production of the Gazetteer of Undersea Feature Names in downloadable electronic form, development of a digital system allowing proposal of names even while at sea during a research cruise or hydrographic survey, interface with the International Bathymetric Chart of the Southern Ocean, the International Bathymetric Chart of the Arctic Ocean and the International Bathymetric Chart of the Mediterranean, the incorporation of shallow-water soundings from electronic and digital navigational charts, updating of specifications, and with the Nippon Foundation the creation of a program that has trained 18 new oceanic bathymetrists, the addition of a Science Day to annual meetings. All these GEBCO activities mean that the 95% of the ocean deeper than navigation depth is better mapped, known and understood than it was five years ago.

6. Recommendations

That, the XVIIth IHO Conference

1. Accepts the GEBCO report as tabled.

2. Endorses the new Terms of Reference and Rules of Procedure of the Guiding Committee and it's Subcommittees annexed to the report.

3. Notes that GEBCO is a joint project of the International Hydrographic Organization (IHO) and the Intergovernmental Oceanographic Commission (IOC) and as such the new Terms of Reference and Rules of Procedure of the Guiding Committee and it's Subcommittees are not in force until also endorsed by the IOC.

4. Recognizing the value of improving the world bathymetry grid in inshore areas, encourages Member States who have not already done to participate in the program that harvests soundings from ENC files.

5. Recommends that the mutually valuable cooperative mapping activities wherein GEBCO maps the entire world ocean and the IBCs apply specialist knowledge to map regional areas, be further supported by Member States. Member States are urged to actively encourage, support and facilitate the submission of all bathymetry data held by organizations within each State to either an IBC or to GEBCO. GEBCO and the IBCs will actively exchange data. Completed IBCs will be published for the benefit of users in their geographic area and submitted to GEBCO for inclusion in the world compilation.

Annexes
- A Joint IHO-IOC GEBCO Guiding Committee - Terms of Reference and Rules of Procedure.
- B Sub-Committee on Undersea Feature Names (SCUFN) -Terms of Reference and Rules of Procedure.
- C Technical Sub-Committee on Ocean Mapping (TSCOM) *(former SCDB)* - Terms of Reference and Rules of Procedure.

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ANNEX A

JOINT IHO–IOC GEBCO GUIDING COMMITTEE

TERMS OF REFERENCE AND RULES OF PROCEDURE

PREAMBLE

GEBCO was proposed in 1899 and became a reality in April 1903 when HSH Prince Albert I of Monaco offered to organize and finance the production of a new chart series designated: "The General Bathymetric Chart of the Oceans" (GEBCO), under the Prince's Scientific Cabinet. In 1922 the responsibility for GEBCO was passed to the Director of the Oceanographic Museum of Monaco and in 1929 was transferred to the International Hydrographic Bureau (today the IHO). Since 1973, GEBCO has been a joint project of the International Hydrographic Organization (IHO) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

The Goals of the IHO-IOC GEBCO Project are to:

1) Develop and constantly improve the authoritative description of global ocean depths,

2) Act as the designated international authority for undersea feature names,

3) Advance the development and application of sea floor mapping technology,

4) Encourage and facilitate scientific cooperation leading to the exchange and preservation of bathymetric data and associated metadata,

5) Foster collaboration among individuals and organizations with established and developing expertise so as to assist local and regional mapping efforts to attain a global standard of quality,

6) Identify oceanic areas that are insufficiently surveyed and recommend to surveying and/or ocean-going organizations and institutions that such areas are mapped.

7) Promote education and training in ocean mapping.

8) Bring together ocean mappers and users of bathymetry thereby leading to products that are more widely used in science and education.

GEBCO is an IHO and IOC project that is open to all those interested in mapping the ocean floor. It relies largely on the voluntary efforts of an international collaborating community of scientists and hydrographers with the support of the IHO and the IOC.

GEBCO is led by the Joint IHO-IOC GEBCO Guiding Committee.

Terms of Reference

The GEBCO Guiding Committee shall:

1. Guide the GEBCO Project, under the general governance of IHO and IOC while recognising and following IHO and IOC policies, where they are concordant.

2. Prepare and disseminate maps, grids, data files and other appropriate depictions of the ocean floor.

3. Identify the needs of the various user communities of the bathymetry of the world's oceans, study the ways and means whereby these needs can be met and, where appropriate, implement actions or propose to IOC and IHO actions, within their purview, which meet these needs.

4. Stimulate the flow of data relevant to the GEBCO Project by actively identifying sources of new data and encouraging and promoting the release of data to appropriate data banks, with the objective of ensuring that maximum available data are provided to the IHO Data Centre for Digital Bathymetry (DCDB).

5. Supervise the development, maintenance and routine updating of GEBCO products. Activities are to include but are not restricted to:

   (1) Study and set out procedures for new compilations of bathymetry.

   (2) Develop standards and methodologies for the production of bathymetric maps and grids and recommend their adoption to the IHO and IOC and to the seafloor mapping community.

   (3) Supervise the development, production and updating of a worldwide grid of digital bathymetric data.

   (4) Supervise the preparation and maintenance, in association with national and international bodies, of an authoritative IHO/IOC GEBCO Gazetteer of Undersea Feature Names (Gazetteer of Geographical Names of Undersea Features)

   (5) Study and implement the best distribution mechanism for the effective use of GEBCO products by all users.

6. Investigate and develop logistical and financial arrangements necessary for the furtherance of the GEBCO Project with the assistance of the IHB and IOC Secretariats.

7. Integrate into its products the geographical names of undersea features that appear in the IHO/IOC GEBCO Gazetteer of Undersea Feature Names.

8. Direct and monitor the work of the GEBCO Sub-Committees and Working Groups; propose to IHO and IOC the creation or termination of Sub-Committees, and create, maintain and terminate Working Groups as deemed necessary.

9. Cooperate, through the Consultative Group on Ocean Mapping (CGOM), with regional International Bathymetric Chart (IBC) projects on the specifications and preparation of regional bathymetric charts, to ensure their compatibility with, and eventual inclusion in, GEBCO products.

10. Build capacity by encouraging and enabling the training and scientific education of new generations of ocean mapping operational experts (bathymetrists)] worldwide.

11. Pursue policies that facilitate the suitability of GEBCO products not only for scientific users but also, where appropriate, for educational and socio-economic purposes in the broadest sense.

12. Take all practical opportunities to advocate the scientific and societal benefits of mapping the seafloor.

13. The GEBCO Guiding Committee shall report to the IHO and IOC annually and should also propose activities to be considered in the IHO's and IOC's work programs, identifying and requesting, where necessary, the required funding support.

Rules of Procedure

1. Membership:

   (1) The Committee shall consist of five members appointed by IHO, five members appointed by the IOC, the Chairpersons of the Sub-Committees and the Director of the IHO Data Centre for Digital Bathymetry (DCDB). In close consultation, IHO and IOC will ensure that all the appointed members are, as far as possible, from different regions taking care of a balanced geographical representation

   (2) Appointed Committee Members shall serve for a term of five years, renewable by a majority of the Committee for one additional five-year term with the approval of the corresponding parent organization.

   (3) Members of the Guiding Committee, if appointed by IHO or IOC, represent their parent organization as experts[1] and no substitution shall be allowed.

   (4) Additionally, the Committee may invite other suitably qualified individuals to take part in their meeting, without voting rights.

   (5) Members are expected to attend every meeting of the Committee. Committee Members who are absent from meetings over two consecutive years will normally be considered to have resigned and new nominations shall be sought.

   (6) Business shall be conducted by correspondence between meetings. E-mail communication will be the normal method. The Committee's Minutes and other relevant documents shall be posted on the GEBCO web site linked to the IHO and IOC web sites.

2. The Chairperson and Vice-Chairperson shall be elected by the Committee from among the members appointed by the IHO and IOC, and normally should be from different parent organizations. The Chairperson and Vice-Chairperson are each elected for a four-year term which can be renewed for one additional term by vote of the Committee. These terms shall take precedence, while in office, over the term of membership of the Committee. The Chairperson, or in his/her absence, the Vice-Chairperson, shall conduct the business of the Committee.

3. The IHB and IOC Secretariats, as well as representatives from Member States of IHO and IOC, may participate as observers in Committee meetings without voting rights.

4. Meetings shall be held at least every two years. The venue and date of the meeting will normally be decided at the previous meeting, in order to facilitate participants' travel arrangements. Minimum quorum to hold a meeting shall be 6. Committee Members. An extraordinary meeting can be called by the Chairperson or any Committee Member, with the agreement of the simple majority of all members of the Committee. The working language of the Committee shall be English.

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[1] *So far as IOC is concerned, the Guiding Committee is classed as a Joint Group of Experts under the IOC guidelines for subsidiary bodies.*

5. The Committee shall strive to make decisions by consensus. If, during a Committee meeting, consensus cannot be reached, decisions shall be taken by simple majority vote of Members of the Committee present. At all other times, a simple majority of all Members of the Committee shall be required. The Chairperson shall have the casting vote if there is a tie.

6. The Committee shall appoint a Secretary for a five-year term which can be renewed by the Committee. At the Committee's request secretarial support shall be provided by IHO and IOC. The Secretary shall be responsible for ensuring that the necessary GEBCO Project coordination is made in accordance with the decisions of the Committee, and that meeting arrangements, invitations, documentation and agenda are prepared. The Secretary shall act as Rapporteur and prepare the draft Summary Report of the meeting which shall be distributed to the Members of the Committee, preferably within one month of the meeting. Member's comments should be returned within one month of distribution of the draft report. The final Summary Report shall be forwarded to the IHO and IOC. The Secretary shall act as secretary between meetings.

7. The Terms of Reference and Rules of Procedure should be endorsed by the assemblies of IHO and IOC. The Committee may propose to IHO and IOC changes to these Terms of Reference and Rules of Procedure with the approval of two thirds of the Committee. Any change shall enter in force after being endorsed by both IHO and IOC.

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ANNEX B

SUB-COMMITTEE ON UNDERSEA FEATURE NAMES (SCUFN)

TERMS OF REFERENCE AND RULES OF PROCEDURE

1. Terms of Reference

1.1 The Sub-Committee on Undersea Feature Names reports to the Joint IOC-IHO GEBCO Guiding Committee (GC) as its designated authority for all matters concerning undersea feature names.

1.2 It is the function of the Sub-Committee to select those names of undersea features in the world ocean appropriate for use on GEBCO graphical and digital products, on the IHO small-scale International chart series, and on the regional IBC series.

1.3 The Sub-Committee shall:

1.3.1 Select undersea feature names from:

a) names provided by national and international organizations concerned with nomenclature,

b) names submitted to the Sub-Committee by individuals, agencies and organizations involved in marine research, hydrography, etc.,

c) names appearing in scientific journals or on appropriate charts and maps,

d) names submitted to the Sub-Committee by the Chairpersons or Chief Editors of IBC projects, in relation to the work on these projects.

All selected names shall adhere to the principles contained in IHO-IOC Publication B-6 “Standardization of Undersea Feature Names” and be supported by valid evidence. Such names shall be reviewed before they are added to the Gazetteer.

1.3.2 Define, where appropriate, the extent of named features,

1.3.3 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.

1.3.4 Encourage the establishment of national boards on undersea feature names where such boards do not exist.

1.3.5 Prepare and maintain an international and worldwide IHO-IOC GEBCO Gazetteer of undersea feature names.

1.3.6 Encourage the use of undersea feature names included in the IHO-IOC GEBCO Gazetteer, on any maps, charts, scientific publications and documents by promulgating these names widely.

1.3.7 Prepare and maintain internationally agreed guidelines for the standardization of undersea feature names and encourage their use.

1.3.8 Review and address the need for revised or additional terms and definitions for submarine topographic features.

1.3.9 Maintain close liaison with the UN Group of Experts on Geographical Names, the focal point of which shall be invitations to attend meetings of the Sub-Committee, and with international or national authorities concerned with the naming of undersea features.

1.3.10 Provide, where feasible, historical information regarding the origin of pre-existing names and, where necessary, alternative names. This research will include discovery ship and/or organization, information regarding the individual or vessel being commemorated or geographic feature with which the name is associated, origin of alternative names if required and source material regarding naming information.

2. Rules of Procedure

2.1 Membership of the Sub-Committee on Undersea Feature Names is covered by the following rules:

2.1.1 The Sub-Committee shall normally consist of 12 members, preferably 6 members being appointed by IHO and 6 by IOC. SCUFN members shall be subject to endorsement by the Joint IOC-IHO GEBCO Guiding Committee (GC).

2.1.2 Appointed Members of the Sub-Committee represent their parent organization as experts[2] and no substitution shall be allowed.

2.1.3 Members of the Sub-Committee shall be appointed for a four-year period, which may be extended for a period of two additional years, with a further provision that, if there are no requests for a member to be included from another Member State, that a further, additional two years of service may be permitted. If another Member State requests membership, the GC shall decide which member will stand down.

2.2 The Chairperson and Vice-Chairperson shall be elected by the Sub-Committee subject to endorsement by the GC. They should normally come from different Parent Organizations.

2.3 The Chairperson is elected for a four-year period and will normally be succeeded by the Vice-Chairperson. The Chairperson may be re-elected for one additional four-year period. Should the Chairperson step down before the end of his/her term, the Vice-Chairperson shall take over as Chair till the end of the current term.

2.4 The Chairperson, or in his/her absence the Vice-Chairperson, shall conduct the business of the Sub-Committee. Meetings will usually be held every year, ideally before the GC meeting. In the intervening period the Sub-Committee shall conduct its business by correspondence (preferably electronic).

2.5 Members are expected to attend every meeting of the Sub-Committee. Sub-Committee Members who are absent from meetings over two consecutive years will normally be considered to have resigned and new nominations shall be sought from the relevant parent organization.

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[2] *So far as IOC is concerned, the Sub-Committee on Undersea Feature Names is classed as a Joint Group of Experts under the IOC guidelines for subsidiary bodies.*

2.6 Representatives of non-governmental entities / organisations, or individuals, that can provide a relevant and constructive contribution to the work of the Sub-Committee may attend meetings with observer status. In the event that a large number of observers seek to attend a meeting, the Chairperson may restrict attendance by inviting them to act through one or more collective representatives.

2.7 Observers from IHO and/or IOC Member States may attend meetings. Attendance shall normally be limited to one observer per Member State.

2.8 Proposals which are to be considered at SCUFN meetings must be submitted 30 days before meetings if in electronic form, or 60 days if in analog form.

2.9 The Sub-Committee should strive to decide by consensus. If a vote is necessary, the quorum required is 7 members. The majority required for acceptance is a simple majority of the total number of members. Only members may cast a vote either in person or by correspondence. The Chairman shall have the casting vote if there is a tie.

2.10 Recommendations of the Sub-Committee shall be submitted to the GC for consideration and decision.

2.11 The Chairperson is to submit an annual report to the Chairperson of the GC.

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ANNEX C

TECHNICAL SUB-COMMITTEE ON OCEAN MAPPING (TSCOM) *(former SCDB)*

TERMS OF REFERENCE AND RULES OF PROCEDURE

Preamble

In May 1977, at GEBCO-IV, the Guiding Committee decided to form a small Sub Committee on Digital Bathymetry to 'investigate... the question: Is there an advantage [in] having digital bathymetric data?' This led to a very positive report being submitted to the Guiding Committee in May 1983, the formation of a larger and more representative Sub- Committee, with revised Terms of Reference, and a recommendation leading to the establishment of the IHO Data Centre for Digital Bathymetry.

Over the years the annual meetings of this Sub-Committee have gained increasing recognition as being of growing importance to the scientific community. >From a meeting of five experts in 1984, the group had grown to thirty-six experts from twenty-five groups in thirteen countries by June 1999.

By 2006 it was recognized that all GEBCO products and nearly all cartographic activities are “digital”, and after the SCDB XXII meeting in Bremerhaven, Germany it is proposed that, as part of the revision of the GEBCO structure, the sub-committee be renamed the “Technical Sub-Committee on Ocean Mapping” (TSCOM).

1. Terms of Reference

1.1 The Sub-Committee reports to the Joint IOC-IHO GEBCO Guiding Committee (GGC) as its designated authority for all technical matters relevant to the goals of GEBCO as set out in the Guiding Committee Terms of Reference and Rules of Procedure.

1.2 The Sub-Committee shall:

1.2.1 Maintain and improve GEBCO products and supporting data such as, but not limited to:
- a) A global bathymetric grid;
- b) The GEBCO Digital Atlas;
- c) Databases of soundings, shorelines, land elevations, remotely sensed and other data, generalized to a useful working scale, as may facilitate update of GEBCO products and maintenance of product quality.

1.2.2 Monitor developments in data availability and relevant technology as may impact GEBCO activities, and recommend to the GC actions that will maintain the excellence of GEBCO products.

1.2.3 Provide advice to individuals and appropriate authorities on the scientific and technical aspects of bathymetric mapping, as requested.

1.2.4 Encourage and facilitate the location, acquisition and exchange of sounding, shoreline, remotely sensed and other data supporting bathymetric mapping.

1.2.5 Investigate the application of GEBCO products, beyond the cartographic sciences, with the aim of producing products that are easily applied to other ocean sciences.

1.2.6 Establish, nurture, and/or disband working groups, as needed, to carry out specific tasks or product developments that relate to the technical advance of the GEBCO project.

1.2.7 Work with SCUFN on matters of joint interest, such as, but not limited to, the shapes or outlines of named features and the automatic placement of feature names.

2. Rules of Procedure

2.1 Membership of the Sub-Committee is covered by the following guidelines:

2.1.1 The Sub-Committee shall consist of up to 10 members, 6 appointed by the Joint IOCIHO GEBCO Guiding Committee (GGC), and 4 appointed by the Sub-Committee.

2.1.2 Members of the Sub-Committee are experts acting exclusively for the benefit of the GEBCO project [3]. They shall be selected for their individual technical expertise and to complement the overall technical breadth of the Sub-Committee as a whole.

2.1.3 Members of the Sub-Committee shall be appointed for a four-year period, which may be renewed.

2.2 The Chair and Vice-Chair shall be elected by the Sub-Committee subject to endorsement by the GGC.

2.3 The Chair is elected for a four-year period and will normally be succeeded by the Vice-Chair. The Chair may be re-elected for one additional four-year period. Should the Chair step down before the end of his/her term, the Vice-Chair will take over as Chair till the end of the current term.

2.4 The Chair, or in his/her absence the Vice-Chair, shall conduct the business of the Sub-Committee. Meetings will usually be held every year. In the intervening period the Sub-Committee shall conduct its business by correspondence (preferably electronic mail).

2.5 Individuals that can provide a relevant and constructive contribution to the work of the Sub-Committee may attend meetings as Scientific Advisors with observer status, at the discretion of the Chair or Vice-Chair.

2.6 Entities and organisations that can provide a relevant and constructive contribution to the work of the Sub-Committee may be represented at meetings with observer status.

2.7 The Sub-Committee shall strive to decide by consensus. If a vote is necessary, the quorum required is 6 members. The majority required for acceptance is a simple majority of the total number of members.

2.8 Recommendations of the Sub-Committee shall be submitted to the GGC for consideration and decision.

2.9 The Chair shall submit an annual report to the Chair of the GGC.

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[3] *So far as IOC is concerned, the Sub-Committee is classed as a Joint Group of Experts under the IOC guidelines for subsidiary bodies.*