



IOC/INF-1381
Paris, 5 June 2019
English only

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

INFORMATION DOCUMENT

**GEBCO GUIDING COMMITTEE BIENNIAL REPORT
TO THE IOC ASSEMBLY FOR THE PERIOD 2017–2019**

Summary

GEBCO (General Bathymetric Chart of the Oceans) is an IHO and IOC Project, which is guided by the Joint IHO-IOC Guiding Committee for GEBCO, made up of representatives from both International Hydrographic Organization and IOC and is supported by the Technical Sub-Committee on Ocean Mapping (TSCOM), the Sub-Committee on Undersea Feature Names (SCUFN), the Sub-Committee on Regional Undersea Mapping (SCRUM), the Sub-Committee on Communications, Outreach and Public Engagement (SCOPE) and the Nippon Foundation/GEBCO Training Project Management Committee (PMC). Additional ad hoc working groups are convened as necessary.

Through the work of its organs, GEBCO produces and makes available a range of bathymetric data sets and products, including gridded bathymetric data sets, the GEBCO Digital Atlas, the GEBCO World Map, the GEBCO [*Gazetteer of Undersea Feature Names*](#) and the GEBCO [*Cook Book*](#). GEBCO maintains a comprehensive website at: <http://www.gebco.net>.

This document reports progress of the GEBCO Project over the period 2017 to 2019.

Officers

GEBCO Guiding Committee:

Chair: Mr Shin Tani (Japan – IHO),

Vice-Chair: Professor Martin Jakobsson (Sweden – IOC),

Permanent Secretary: Mr David Wyatt (IHO).

Sub-Committee on Undersea Feature Names (SCUFN):

Chair: Dr Hans Werner Schenke (Germany – IOC) until 2018,

Chair: Mr Hyun-Chul Han (Republic of Korea – IOC) from 2018,

Vice-Chair: Dr Yasuhiko Ohara (Japan – IHO).

Technical Sub-Committee on Ocean Mapping (TSCOM):

Chair: Dr Karen Marks (USA) until 2018,

Chair: Mr Thierry Schmitt (France) from 2018,

Vice-Chair: Mr Thierry Schmitt (France) until 2018,

Vice-Chair: Ms Caitlyn Raines (ESRI) from 2018.

Sub-Committee on Regional Undersea Mapping (SCRUM):

Chair: Dr Vicki Ferrini (USA),

Vice-Chair: Ms Pauline Weatherall (UK).

Sub-Committee on Communications, Outreach and Public Engagement (SCOPE):

Chair: Professor Hyo Hyun Sung (Republic of Korea) from 2018,

Vice-Chair: vacant.

Introduction

During the period cover by this report, a continuing and growing interest in the health and status of the oceans by many governments, international and philanthropic organizations and by the public more generally has been maintained. The current heightened awareness and global focus on the ocean and related topics resulting from a number of high profile initiatives, such as UN 2030 Agenda for Sustainable Development, the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC), the Sendai Framework for Disaster Risk Reduction 2015–2030, and the UN Decade of Ocean Science for Sustainable Development (2021–2030), have all highlighted the lack of comprehensive global bathymetric coverage, which is recognised as a fundamental element to achieve the goals of these initiatives. The Nippon Foundation-GEBCO Seabed 2030 Project (Seabed 2030), which became operational in February 2018, has been at the forefront of this focus. Seabed 2030 has created a global movement to search out new datasets to be added to the currently available bathymetry with the IHO Data Centre for Digital Bathymetry (DCDB) being identified as the preferred data store. The long-running GEBCO Project, previously rarely mentioned or recognised by the participants in any of the above related activities, has benefited from this raised awareness and focus, which has been further highlighted by the publication of the new 15 arc second GEBCO_2019 grid as the first tangible result of the Seabed 2030 Project.

Meetings of Relevant GEBCO Bodies

GEBCO Guiding Committee

The 34th meeting of the GEBCO Guiding Committee (GGC) was held in Busan, Republic of Korea, the 16 and 17 November 2017 and the 35th meeting of the GEBCO Guiding Committee (GGC) was

held in Canberra, Australia, the 15 and 16 November 2018. Both meetings were chaired by Mr Shin Tani.

At its 34th meeting the GGC received brief reports from its Sub-Committees and Working Groups and endorsed the work which they had undertaken. The GGC also received reports from key personnel performing functions on behalf of GEBCO as well as reports from its parent bodies (IHO and IOC) on activities since the previous meeting.

The Chair of the Sub-Committee on Undersea Feature Names (SCUFN) highlighted the number of members who were coming to the end of their terms and the challenge of finding suitably qualified replacements. He presented some proposed revision to the SCUFN Terms of Reference (ToRs) and Rules of Procedure (RoPs), which were aimed at clarifying the procedures for future meetings. The GGC did not approve the amendments and advised the Chair of the SCUFN to continue to operate under the current ToRs and RoPs with an option to review the situation prior to the next GGC meeting.

The GGC discussed outreach and ways to raise the profile of the GEBCO project among the different stakeholder and user communities including the IHO and the IOC Member States, the maritime and scientific community and the general public. It was noted that different strategies would be required for each of these groups and that it was a key component of the GEBCO activities, which involved and influenced all aspects of the future of the GEBCO Project. The GGC agreed to elevate the status of the Open Working Group (OWG) to a new Sub-Committee in order to reflect the importance of external relations and communications. It was agreed that revised ToRs and RoPs should be drafted along with a new communications strategy. The GGC devoted considerable time to discussions on the Seabed 2030 Project, including its structure, governance, oversight and reporting. The Seabed 2030 Project Establishment Team requested GGC endorsement to continue the development of the project, including the selection of a Project Director and the necessary structure to oversee the project.

At its 35th meeting, the GGC received brief reports from its Sub-Committees and Working Groups and endorsed the work which they had undertaken. The GGC also received reports from key personnel performing functions on behalf of GEBCO as well as reports from its parent bodies (IHO and IOC) on activities since the previous meeting.

The Chair of the Sub-Committee on Undersea Feature Names (SCUFN) reported on the changes of membership and the election of a new Chair (Hyun-Chul Han) and Vice-Chair (Yasuhiko Ohara). He noted that there remained one IOC vacancy to be filled. He highlighted some changes proposed to the publication B-6 “Standardization of Undersea Features Names” to make the supporting bathymetric data available to the IHO DCDB as part of a submission. The GGC endorsed an amendment to the ToRs article 2.8 of the SCUFN to increase the submission deadline from 30 days to 60 days for all formats of submissions. He reported on the activities of the Undersea Feature Names Project Team (UFNPT) and the proposed future activities related to the development of an S-100 based Product Specification and the registration of terms in the [IHO Geospatial Information Registry](#).

The GGC considered outreach and ways to raise the profile of the GEBCO project among the different stakeholder and user communities, including the IHO and the IOC Member States, the maritime and scientific community and the general public. The GGC approved the creation of the new Sub-Committee on Communications, Outreach and Public Engagement (SCOPE) and directed the Chair of the OWG to develop appropriate ToRs. In addition, the GGC requested the Chairs of all Sub-Committees to review their ToRs with a view to achieve better harmonization and consistency. The GGC also requested the Chair OWG to generate a draft communications strategy for consideration at the 36th meeting of the GEBCO Guiding Committee (GGC36). The GGC devoted considerable time to discussions on the Seabed 2030 Project. The interim Seabed 2030 Project Director provided a comprehensive presentation on the establishment and activities of the Seabed 2030 Project Team and the regional centres. He highlighted the key personnel involved in the Project

Team and the Sponsors. He also presented the initial goals and work packages included in the initial establishment documentation and the overall goal of the project being to complete the GEBCO Grid started in 1903. The GGC reviewed the Year 1 Seabed 2030 Project report and the proposed Year 2 Project Workplan and both were endorsed after inclusion of a number of amendments and recommendations, see report of 35th meeting of the GGC ([GGC35/13](#)).

It was noted that the current Chair and Vice-Chair had completed their five-year terms in these roles. In accordance with Terms of Reference, article 2.1, the GGC re-elected Shin Tani and Martin Jakobsson as Chair and Vice-Chair, respectively, for a period of up to two years. In addition it was agreed that a minor amendment to the ToRs article 2.1 (Office Bearers), reducing the terms of office from 5 to 3 years renewable for one additional term, should be proposed to the IHO and IOC, as it was felt that the current five-year term was too great a burden and commitment to attract suitable volunteers in the future (track changes version attached as [Annex](#) to this document).

It was agreed that the 36th meeting of the Committee would take place, together with meetings of TSCOM, SCRUM, SCOPE and the GEBCO Symposium, in Portsmouth, New Hampshire, USA, from 4 to 8 November 2019.

Technical Sub-Committee on Ocean Mapping (TSCOM) and Sub-Committee on Regional Undersea Mapping (SCRUM)

The GEBCO Technical Sub-Committee on Ocean Mapping (TSCOM) and the Sub-Committee on Regional Undersea Mapping (SCRUM) held a joint meetings the 13 and 14 November 2017 and the 12 and 13 November 2018. Both meetings were co-chaired by Dr Karen Marks (USA), (Chair of TSCOM), and Dr Vicki Ferrini (USA), (Chair of SCRUM).

The TSCOM is responsible for producing and maintaining the GEBCO global digital grids which are used by ocean scientists, academia, map producers and many other communities. The meeting reviewed new contributions of bathymetric data that had been received in coastal and shallow water.

At its 2017 meeting, update reports were provided on the following regional mapping projects: Indian Ocean Bathymetric Compilation (IOBC), North Atlantic Seabed Mapping Project, International Bathymetric Chart of the Arctic Ocean (IBCAO) and International Bathymetric Chart of the Southern Ocean (IBCSO). The participants considered in detail the proposed Seabed 2030 Project. The Seabed 2030 Project Establishment Team presented the activities undertaken during the period since the 33rd meeting of the GGC, which were discussed in detail during the breakout sessions. A number of challenges and gaps were identified, which needed further investigation. It was recognised that the relationship with the GGC and with other bodies required refinement. Professor Hyo Hyun Sung, Chair of the OWG, presented a detailed update on activities, initiatives and considerations. During the subsequent discussions the participants discussed ways to expand the communications beyond the education focus and how the OWG should support and complement the Seabed 2030 project.

The Sub-Committee on Regional Undersea Mapping (SCRUM) at its 2017 meeting update reports were provided on the following regional mapping projects: Indian Ocean Bathymetric Compilation (IOBC), North Atlantic Seabed Mapping Project, International Bathymetric Chart of the Arctic Ocean (IBCAO), International Bathymetric Chart of the Southern Ocean (IBCSO), Canadian Hydrographic Service (CHS) activities, European Marine Observation and Data Network (EMODnet) Bathymetry Digital Terrain Model (DTM) 09/2018 developments, Istituto Idrografico Della Marina (IIM) of Italy in the Arctic region, contributions to the GEBCO and Seabed 2030 projects and the Open Geospatial Consortium (OGC) and its relevance to GEBCO and Seabed 2030 project.

Reports were received from the Seabed 2030 Regional Data Assembly and Coordination Centres (RDACCs) and the Global Data Assembly and Coordination Centres (GDACCs). A comprehensive brief were provided on the developments in the IHO Data Centre for Digital Bathymetry (DCDB) and future proposed enhancements. Details were also provided on the Crowdsourced Bathymetry (CSB)

initiative and the collaboration with Rosepoint Navigation to gather position and depth data via ECS from small vessels. The work to enhance the data collected via the Voluntary Observing Ships (VOS) programme to include bathymetry was highlighted.

Professor Hyo Hyun Sung, Chair of the OWG, presented a detailed update on activities, the proposed GEBCO outreach and capacity building strategies and suggested a way forward in consideration of the decision at GGC34 to create a new Sub-Committee out of the existing Outreach Working Group (OWG) with responsibility for Outreach, Communications and Engagement, to be called the Sub-Committee on Communications, Outreach and Public Engagement (SCOPE).

At the conclusion of the TSCOM meeting, Dr Karen Marks stood down as Chair and Mr Thierry Schmitt (France) and Ms Caitlyn Raines (ESRI) were elected as Chair and Vice-Chair of TSCOM, respectively, for the period 2019 to 2022.

Sub-Committee on Undersea Feature Names (SCUFN)

SCUFN is tasked with selecting the names of undersea features to appear in the products of the GEBCO project and on international nautical charts. These names, widely used in scientific publications also, are made available in the GEBCO *Gazetteer of Undersea Features Names* (www.gebco.net > Data and products > Undersea feature names > view and download).

The 30th meeting of the IHO-IOC GEBCO Sub-Committee on Undersea Feature Names (SCUFN) was hosted by the Istituto Idrografico della Marina (IIM), in Genoa, Italy, from 2 to 6 October.

SCUFN is tasked with the determination of the names of undersea features to appear in the products of the IHO-IOC General Bathymetric Chart of the Oceans (GEBCO) project and on international nautical charts. These names, also widely used in scientific publications, are made available in the GEBCO *Gazetteer of Undersea Features Names*. The meeting, chaired by Dr Hans Werner Schenke (IOC representative) from the Alfred Wegener Institute for Polar and Marine Research (AWI – Germany), was attended by 26 participants, which consisted of 9 of the 12 SCUFN members (4 IOC and 5 IHO representatives), 4 members of the SCUFN Project Team on Undersea Feature Names (UFN PT) and 11 observers, including Mr Shin Tani (Chair of the GEBCO Guiding Committee) and Mr Tetsushi Komatsu (IOC Secretariat). Assistant Director Yves Guillaum (SCUFN Secretary) and Project Officer Atilio Aste (Seconded Officer from Peru) represented the IHO Secretariat.

The meeting was opened by Captain Luigi Sinapi, Director of the IIM, who welcomed all the participants and stressed that SCUFN work is very important and strategic in order to support not only the GEBCO maps and other GIS products, but also the GEBCO Seabed 2030 project, aiming to develop a new global high resolution map of the oceans. The Chair of SCUFN introduced a new SCUFN Member: Mr Felix Frias Ibarra (Mexico, IOC representative). In accordance with the SCUFN Terms of Reference, the Secretary informed the meeting of eight anticipated changes to the membership due to occur after the meeting and mainly in 2018. He presented the timeline for the IHO and IOC Secretariats to prepare calls for nominations to fill vacancies, drawing the attention on the need to balance continuity and renewal in the selection process.

The Sub-Committee considered new proposals for 113 undersea feature names, submitted by various bodies and supporting organizations from Brazil (9), China (41), Japan (36), Republic of Korea (4), Republic of Palau (17), New Zealand (2) and USA (4). The Sub-Committee pursued the fast-track procedure in its review for the additional proposals made by New Zealand (7) related to names that already appear on nautical charts. Finally, the Sub-Committee considered the report from the New Zealand Geographic Board on the outcome of previous fast-track proposals, evaluated (10) or submitted (23) in 2016 at SCUFN29.

In addition to consideration of the naming proposals, the Sub-Committee considered several “corporate” issues, including:

- The endorsement of an amendment to the SCUFN Rules of Procedure that will be submitted for approval by the GEBCO Guiding Committee at its 34th meeting;
- Benefits of participating on a more regular basis in the Sessions of the United Nations Group of Experts on Geographical Names (UNGEGN);
- Cooperation between Marine Regions, SCUFN and UFN PT to deconflict naming and positions between different sources and contribute to the UFN data modelling;
- Development of a preliminary test case of the current IHO Geospatial Information Registry using the UFN Data Motel (S-57) taking into account the current concept definitions in force in Ed. 4.1.0 of Publication B-6 “Standardization of Undersea Feature Names” (Guidelines; Proposal Form, Terminology),
- Preparation of Ed. 4.2.0 of Publication B-6, which will include the integration of the fast-track procedure for existing names which are already charted and improvements of the proposals submission in digital format (geometry, additional maps, etc.);
- The current and future status of the maintenance and improvement of the GEBCO Gazetteer interface by the National Oceanic and Atmospheric Administration (NOAA) of the United States;
- The development of a prototype on integrated SCUFN web services and database by the Republic of Korea; and
- The increasing resources needed to incorporate SCUFN naming decisions into the GEBCO Gazetteer and the fact that this can only be achieved by contracting out some work during the inter-sessional period.

Finally, the SCUFN Generic Term Group was also invited to prepare for the next meeting, a “straw man” paper proposing a general strategy and possible guidelines defining the optimal horizontal resolution between undersea features that are eligible for naming. The aim is to rationalize the naming process in some areas, to better manage the number of internationally-recognized features named while new technologies offer more possibilities, limit the clutter in mapping, and improve consistency with associated existing features.

The 31st meeting of the IHO-IOC GEBCO Sub-Committee on Undersea Feature Names (SCUFN) was hosted by the New Zealand Geographic Board, the National Institute of Water and Atmospheric Research (NIWA), GNS Science and Land Information New Zealand (LINZ), in Wellington, New Zealand, from 23 to 27 October 2018.

The meeting was opened by Mr Apanui Williams (LINZ), providing a traditional Māori welcome. In addition, welcoming remarks were given by Hon Eugenie Sage, Minister for Land Information, Ms Gill Jolly, Acting-General Manager for Strategy, GNS Science and Mr John Morgan, Chief Executive of National Institute of Water and Atmospheric Research (NIWA). The representatives from the host organizations welcomed all the participants and stressed that SCUFN's work is very important and strategic in order to support not only the GEBCO maps and other GIS, but also the GEBCO Seabed 2030 project, aiming to develop a new global high resolution map of the oceans.

The Sub-Committee considered proposals for 281 undersea feature names (a record in SCUFN history!), submitted by various bodies and supporting organizations from Ascension Island (UK) (1), Brazil (5), China (79), Costa Rica (1), Japan (76), Philippines (16), Republic of Korea (3), Republic of Palau (40), New Zealand (15) and USA (45).

While a large number of the names proposed to the Sub-Committee were accepted, decisions on some were kept as pending (54 from China in particular) for further consideration for various reasons, including the need for the proposers to take into account the guidelines given in Publication B-6 – “Standardization of Undersea Feature Names” (Guidelines, Proposal Form, Terminology) about the grouping of specific terms in the same categories. Some other proposals were not accepted (44 from NOAA, USA, in particular) as they were considered as not meeting the minimum standards.

In addition to the analysis of naming proposals, the Sub-Committee considered several “corporate” issues, including:

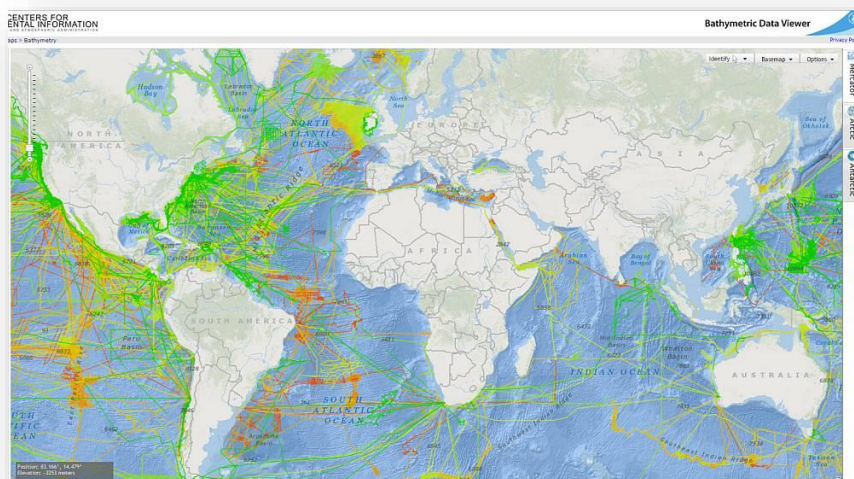
- The endorsement of an amendment to the SCUFN Rules of Procedure and the new Edition of B-6 that will be submitted for approval by the GEBCO Guiding Committee at its 35th meeting;
- The development of a repository of typical cases in a “cook book” aiming to help for the consistency of the decision making process within SCUFN;
- The importance of multilateral consultations between proposers prior to SCUFN meetings when the feature may be located in areas of mutual interests, which are now facilitated by the availability on the SCUFN webpage of a List of Naming Authorities by country;
- The cooperation between Marine Regions, SCUFN and UFN PT to de-conflict naming and positions between different sources and contribute to the UFN data modelling;
- The current and future status of the maintenance and improvement of the GEBCO Gazetteer interface by the National Oceanic and Atmospheric Administration (NOAA) of the United States, in parallel with the development of a prototype on integrated SCUFN web services and database by the Republic of Korea; and
- The increasing resources needed to incorporate SCUFN naming decisions into the GEBCO Gazetteer and the fact that this can only be achieved by contracting out some work during the inter-sessional period.

SCUFN elected Dr Hyun-Chul Han (Republic of Korea, IOC representative) as Chair and Dr Yasuhiko Ohara (Japan, IHO representative) as Vice-Chair. The Sub-Committee also welcomed the offer made by Malaysia to host the next meeting in August 2019.

In his final address, Dr Hans Werner Schenke reflected on the accomplishments of SCUFN over the last fifteen years and fondly recalled the former members who provided outstanding support to SCUFN activities. He expressed his hope that the name of Dr Galina Agapova (Geological Institute of the Russian Academy of Sciences), who passed away on 14 August 2018, could be given to a major undersea feature in the future.

Operation of IHO Data Centre for Digital Bathymetry

Since its inception, the IHO Data Centre for Digital Bathymetry (DCDB) has become a prominent repository of digital oceanic bathymetry and is used by IHO Member States and other ocean science communities. The IHO DCDB facility is generously hosted by the National Oceanographic and Atmospheric Administration (USA) on behalf of the IHO Member States.



IHO DCDB Web Map Interface

The IHO DCDB data store contains oceanic soundings that have been acquired by hydrographic, oceanographic and other vessels during surveys or while on passage. These data are used for the production of improved and more comprehensive bathymetric maps and grids, particularly in support of the GEBCO Project. Bathymetric data located at the IHO DCDB can be viewed/filtered via a web map interface, and freely downloaded. The map interface can be accessed from: <http://maps.ngdc.noaa.gov/viewers/bathymetry/>

Contribution of bathymetric data to the IHO DCDB

The GEBCO Ocean mapping programme is dependent upon the availability of bathymetric data and undersea feature information. In order to achieve its goals, GEBCO proactively collects, stores and disseminates bathymetric data for the world's oceans. GEBCO has worked towards improving its participation in regional mapping activities and has also appointed representatives to participate in selected RHC meetings.

Traditionally GEBCO has focused on areas deeper than 200 m, however, it is now actively collecting data in shallow water areas to support activities such as coastal zone management and the mitigation of seaborne disasters such as storm surges and tsunami inundation. IHO Member States are encouraged to contribute bathymetric data in shallower coastal areas to support the production of higher resolution gridded data products and to complete the GEBCO grid coverage.

SEABED 2030 Project

Initiated at the Forum for Future Ocean Floor Mapping by Mr Sasakawa, Chairman of the Nippon Foundation, in Monaco in June 2016, the Nippon Foundation-GEBCO Seabed 2030 Project commenced its operational phase at the beginning of February 2018. Under the initial Directorship of Mr Bindra Sindra, the project stood up the four regional centres (North Pacific-Arctic Oceans, South and West Pacific Ocean, Atlantic-Indian Oceans, and Southern Ocean) and the Global Centre based at the British Oceanographic Data Centre (BODC) of the National Oceanographic Centre (NOC) in the United Kingdom. A number of regional meetings have been held with a focus on data discovery, making data publically available and gap assessment. A reappraisal analysis of the data coverage of the GEBCO 15 arc second grid, based on current technology variable resolution bands, indicates that about 6% of the current GEBCO grid has been completed. The Seabed 2030 Project has a goal of completing the GEBCO grid by 2030, such that each grid cell at the defined target resolutions that varies by depth will contain at least one depth sounding. A new GEBCO grid is expected to be released in early 2019, which will contain significantly more data, particularly in the Arctic and Antarctic regions, where the coverage has increased to approximately 15%.

Work continues on making additional datasets available and encouraging the IHO Crowdsourced Bathymetry (CSB) initiative to help increase the publically available bathymetric data. The Seabed 2030 regional and global centres continue to work closely with the Crowd-Sourced Bathymetry Working Group (CSBWG).

Bathymetric publications

- [B-4 – Information concerning recent bathymetric data](#)

The IHO DCDB is a recognized international repository for all deep ocean bathymetric data (greater than 100 m) collected by hydrographic, oceanographic and other vessels. It has also received significant contributions of crowdsourced bathymetric data. These data can be viewed from:

<https://maps.ngdc.noaa.gov/viewers/csb/>, and
<http://maps.ngdc.noaa.gov/viewers/bathymetry/>.

The DCDB data are publically available and used for the production of improved and more comprehensive bathymetric maps and grids, particularly in support of the GEBCO Ocean Mapping Programme.

The DCDB has been working with the private sector to provide a facility for mariners to log bathymetry (position, depth, and time) data using their Electronic Chart Systems, and forward this data to DCDB. Crowdsourced Bathymetry can be provided in GeoJSON format, amongst others.

- B-6 – Standardization of Undersea Feature Names

Edition 4.1.0 of Publication B-6 on the Standardization of Undersea Feature Names entered into force in September 2013 ([English/French version](#)). It provides guidelines for naming features, a naming proposal form and a list of generic terms with definitions. Edition 4.1.0 of B-6 is now available in [English/Spanish](#), [English/Russian](#), [English/Japanese](#), [English/Korean](#) and [English/Chinese](#) versions. Some definitions were reviewed in 2015 in preparation of a future edition. A draft new edition of B-6 was developed in 2016 including the outcome of the work done by the SCUFN Generic Term Sub-group and some editorial corrections. Due to the concerns raised at the 29th meeting of SCUFN on possible improvements of B-6 to better reflect some sensitive cases, and considering that the fast-track review procedure was not finalized yet, SCUFN Members agreed that there was no need for speeding up its review within SCUFN and issue a new edition.

- B-8 – GEBCO Gazetteer of Undersea Feature Names

The on-line [GEBCO Gazetteer of Undersea Feature Names](#), developed by the IHO DCDB, was maintained jointly by the IHO Secretariat and IHO DCDB and was fully available to the users during the period of this report. The continuing maintenance of this interface, for corrections and possible upgrades, was raised at the SCUFN-28 meeting in October 2015, as matter of concern, especially since the Gazetteer of Undersea Feature Names database is connected to other geospatial portals around the world (Marine Regions for instance). All decisions made at previous SCUFN meetings were implemented into the database, thanks to a contract awarded in 2016.

- B-9 – GEBCO Digital Atlas

IHO publication B-9 – GEBCO Digital Atlas ([GDA](#)) is a two-volume DVD and CDROM set which contains: the GEBCO global bathymetric grid at 30 arc-second intervals; the GEBCO One Minute Grid global bathymetric grid, a global set of digital bathymetric contours and coastlines, the GEBCO gazetteer of undersea feature names and a software interface for viewing and accessing the data sets. The GEBCO grids are generated by combining quality-controlled ship depth soundings with depth interpolations between sounding points guided by satellite derived gravity data. The grid is available for download from the GEBCO website. No update was issued in 2018, although the proposed release of the GEBCO 2018 grid at 15 arc second was delayed and has now been released in March 2019 as the GEBCO_2019 grid, it is an enhanced product based on the unpublished 30 arc second GEBCO_2017 grid.

- B-11 – GEBCO Cook Book ([IOC Manuals and Guides, 63](#))

The GEBCO Cook Book ([IHO publication B-11](#)) is a technical reference manual that has been developed to assist and encourage participation in the development of bathymetric grids. It is an important GEBCO reference document that is used by academic institutions and hydrographic organizations. The Cook Book covers a wide range of topics such as data gathering, data cleaning, examples of gridding, and provides an overview of different software applications used for producing bathymetric grids.

The Cook Book was first released as IHO Publication B-11 in April 2012 and as an IOC guide document in October 2012. Chapter 16 entitled *Finding Gaps to Map*, was added in September 2018. This chapter has three sections: *Google Earth Pro and SRTM30_PLUS Overlays*, *Assessing Gaps via Bathymetric Sounding Density*, and *A GIS Approach to Prioritizing the Gaps to Map*.

Outreach and education about ocean mapping

GEBCO continues to promote the importance of bathymetric data to the international community.

The GEBCO Outreach Working Group considered how to improve the GEBCO website in order to make ocean mapping more interesting / enticing for scholars and students. The WG discussed what content could be added to make it a valuable resource for student projects, and considered how this could be harmonized with Seabed 2030 Project developments. It was highlighted that the communications strategy was the overall priority for GEBCO and to this end the GGC decided to transform the Outreach Working Group into the Sub-Committee for Communications, Outreach and Public Engagement (SCOPE). The new SCOPE was directed to develop a short strategy document to provide guidance of how to take forward the identified tasks, the immediate priorities of which were listed as: branding clarity, social media strategy/implementation/engagement and outreach strategy.

In addition, the IHO-IOC GEBCO Cook Book continues to be used as an important educational resource for ocean mapping students.

GEBCO Website

The GEBCO website provides access to information about GEBCO's products, services and activities. The website can be viewed at <http://www.gebco.net>.

GEBCO bathymetric maps and data sets can be downloaded from the website. These continue to be accessed by a wide user community that includes commercial and academic sectors and the general public.

The GEBCO website also provides access to the world grid via a Web Map Service (WMS). The GEBCO's website has been maintained and updated on behalf of GEBCO by the British Oceanographic Data Centre (BODC) since July 2008. The GEBCO website underwent a complete revamp in 2018, the result being a much more modern and refreshed appearance with improved links to the relevant partner websites of the IHO, IOC, DCDB and Seabed 2030.

GEBCO Gazetteer (B-8) for internet access

The database of the on-line GEBCO Gazetteer of Undersea Feature Names, developed by the IHO DCDB (co-located at one of the US National Centers for Environmental Information (NCEI)), was maintained by the IHO Secretariat through contract support. Some maintenance issues and the requirements for possible upgrades were further investigated.

ANNEX

Track changes revision to GGC ToRs proposed by GGC35.

**GENERAL BATHYMETRIC CHART OF THE OCEAN (GEBCO) PROJECT –
TERMS OF REFERENCE AND RULES OF PROCEDURE FOR
THE JOINT IHO-IOC GEBCO GUIDING COMMITTEE**

(Original text adopted by the IOC on 22 June 2015 and the IHO on 11 Sept. 2015)

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 portrayal 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 ocean mapping 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 mapped and recommend to appropriate ocean-going organizations and institutions that such areas are surveyed;
7. Promote education and training in ocean mapping through high level courses in Ocean Bathymetry acknowledged by the IHO and IOC;
8. Bring together the ocean mapping community and users of bathymetry thereby leading to products that are more widely used.

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:

- 1.1 Guide the IHO-IOC GEBCO Project, under the general governance of IHO and IOC while recognising and following IHO and IOC policies.
- 1.2 Prepare and disseminate maps, grids, data files and other appropriate depictions of the ocean floor.
- 1.3 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.

- 1.4 Identify the necessary resources, both human and financial, for its undertakings and make appropriate recommendations to its parent organizations.
- 1.5 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).
- 1.6 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.
 - (5) Study and implement the best distribution mechanism for the effective use of GEBCO products by all users.
- 1.7 Investigate and develop appropriate logistical and financial arrangements necessary for the furtherance of the GEBCO Project, recognising and taking into account the relevant IHO and IOC policies, and seeking the assistance of the Secretariats of the IHO and IOC as appropriate.
- 1.8 Integrate into its products the geographical names of undersea features that appear in the IHO-IOC GEBCO Gazetteer of Undersea Feature Names.
- 1.9 As required, establish subordinate bodies (sub-committees and working groups) to fulfil the Committee Work Programme and approve the Terms of Reference and Rules of Procedure of those bodies, reviewing annually the continuing need for each subordinate body. The GEBCO Guiding Committee will report annually and intersessionally if necessary, to the IHO and IOC for endorsement on the status of subordinate bodies and encompass their comments before establishing, reviewing, modifying, and/or terminating subordinate bodies; actions which must be included as GGC agenda items to allow sufficient prior consideration by the IHO and IOC secretariats and member states.
- 1.10 Direct and monitor the work of its subordinate bodies.
- 1.11 Engage with regional mapping projects to encourage their compatibility with, and eventual inclusion in, GEBCO products.
- 1.12 Build capacity by encouraging and enabling the training and scientific education of new generations of ocean mapping operational experts worldwide.
- 1.13 Pursue, in dialogue with the IHO and IOC, 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.
- 1.14 Take all practical opportunities to advocate the scientific and societal benefits of mapping the seafloor.
- 1.15 Report annually to the IHO and to the IOC, through their respective governing bodies and should also propose activities to be considered in the IHO's and IOC's work programmes, identifying and requesting, where necessary, the required funding support.
- 1.16 Prepare an annual GEBCO Work Plan and budget and propose it to each meeting of the IHO and IOC, through their respective governing bodies. The Guiding Committee should

consider and submit to the IHO and IOC governing bodies proposals for new work items under the GEBCO Work Plan, taking into account the financial, administrative and wider stakeholder consequences.

- 1.17 Monitor the execution of the GEBCO Work Plan and receive reports from its Subordinate Bodies, including an evaluation of performance and progress achieved against agreed objectives.

Rules of Procedure

1. Membership

- 1.1 The Committee shall consist of five Members appointed by the IHO, and five Members appointed by the IOC. The Secretariats of the IHO and IOC, in close consultation with the Committee Chair, will seek to strive that all appointed Members are, as far as possible, from different regions so as to achieve a balanced and diverse representation.
- 1.2 Appointed Members shall serve for a term of five years, renewable by a majority recommendation of the Committee for one additional five-year term and with the approval of the corresponding parent organization. The Chair shall inform the relevant parent organization of any foreseeable vacancy in a timely manner.
- 1.3 The Chairs of GEBCO Sub-Committees established under Article 9 of the Terms of Reference and the Director of the IHO Data Centre for Digital Bathymetry (DCDB), shall also be voting Members of the Committee. If a Member of the Committee mentioned under paragraphs 1.1 and 1.2 above is also the Chair of a subordinate body, that Member shall have only one vote on the Committee.
- 1.4 Representatives of the Secretariats of the IHO and IOC shall be permanent Observers in the Committee. The Secretariats of the IHO and IOC will also be recognised as permanent Observers in all subordinate bodies established by the Committee.
- 1.5 The Committee may invite other suitably qualified individuals to take part in specific meetings as Expert Contributors.
- 1.6 Members of the Guiding Committee serve as experts¹ in their personal capacity rather than as representatives of their organization and/or country.
- 1.7 Members are expected to attend every meeting of the Committee. Members who are absent for two consecutive meetings will normally be considered to have resigned and new nominations shall be sought. No substitution shall be allowed at meetings.
- 1.8 Business may be conducted between meetings by appropriate communication systems.
- 1.9 All documents related to meetings and decisions of the Committee and Sub-Committees and other relevant documents will be posted on the GEBCO web site linked to the IHO and IOC web sites.

2. Office Bearers

- 2.1 The Chair and Vice-Chair shall be elected by the Committee from the voting Members of the Committee and normally should be from different parent organizations. The Chair and Vice-Chair are each elected for ~~up to a five~~ **three**-year term, but not exceeding their current membership of the Committee. They can be re-elected for **a maximum of** one additional term by the Committee. The Chair shall conduct the business of the Committee. If the Chair is unable to carry out the duties of the office, the Vice-Chair shall assume the Chair with the same powers and duties.

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.

- 2.2 The Committee shall appoint a Secretary for a five-year term which can be renewed by the Committee. If resources permit and at the Committee's request, a secretary may be provided by either the Secretariat of the IHO or the IOC. The function of the Secretary shall be defined by the Guiding Committee.

3. Meetings

- 3.1 Representatives from Member States of IHO and IOC may participate as observers in Committee meetings.
- 3.2 Meetings shall be held at least every two years. The venue and date of the next meeting will normally be decided at the previous meeting, in order to facilitate participants' travel arrangements.
- 3.3 The quorum to hold a meeting shall be two more than half of the voting Members of the Committee.
- 3.4 An extraordinary meeting can be called by the Chair or any Committee Member, with the agreement of the simple majority of all voting members of the Committee.
- 3.5 The working language of the Committee shall be English.
- 3.6 The Committee shall strive to make decisions by consensus. If consensus cannot be reached, decisions shall be taken by simple majority vote of the Members entitled to vote. The Chair shall have the casting vote if there is a tie.

4. Amendment and Revision

- 4.1 These Terms of Reference and Rules of Procedure shall be endorsed and approved by the IHO and IOC according to their current procedures. 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 changes shall enter in force after being endorsed and approved by both IHO and IOC.