

Report of the GEBCO Guiding Committee

Submitted by: Chair

Related Documents: IHO CL 02/2020 dated 10 January 2020
 IHO CL 07/2020 dated 20 January 2020
 IHO CL 11/2020 dated 11 February 2020
 IHO CL 14/2020 dated 13 March 2020
 IHO CL 17/2020 dated 11 May 2020
 IHO CL 24/2020 dated 25 June 2020
 IHO CL 10/2021 dated 5 March 2021

See Annex C for IHO Publications and Resolutions

Related Projects: Nippon Foundation-GEBCO Seabed 2030

Chair:	Shin Tani, Japan (until 20 January 2021) Evert Flier, Norway (from 20 January 2021)
Vice-Chair:	Martin Jakobsson, Sweden (until 20 January 2021) Marzia Rovere, Italy (from 20 January 2021)
Secretary:	David Wyatt, IHO
Member States:	Australia, Brazil, France, India, Italy, Japan, Norway, Poland, Republic of Korea, Sweden, UK, USA
Expert Contributors:	Fugro

See Annex A for full details

1. Meetings Held During Reporting Period including Work Program activities

GEBCO Guiding Committee

At its 37th 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 GGC considered outreach and ways to raise the profile of the GEBCO program among the different stakeholder and user communities, including the IHO and the IOC Member States, the maritime and scientific communities and the general public. The GGC reviewed the communications strategy and approved SCOPE to continue its work in line with the strategy. The GGC devoted considerable time on discussions on the Seabed 2030 Project. The Seabed 2030 Project Director provided a comprehensive presentation on the activities of the Seabed 2030 Project Team and the Regional Centers. The GGC reviewed a proposed GEBCO Funding Strategy, as well as reviewing the Year 3 Seabed 2030 Project report and

the proposed Year 4 Project Work Plan and both were endorsed after some clarifications and recommendations.

The GGC has started work on a GEBCO wide Code of Conduct in order to ensure procedures are in place to address potential conflicts of interest should they arise.

The GGC also reviewed its current financial situation in relation to proposed planned projects. The Committee addressed the budget submissions from its subordinate bodies and approved the proposed allocations. The draft consolidated GEBCO Work Plan and budget will be reported to the 13th meeting of the IHO Inter-Regional Coordination Committee (IRCC) and the 31st session of the IOC Assembly, for consideration and endorsement of the parent organizations.

The GGC reviewed the state of membership and it was noted that there were two IOC appointed vacancies with the cancellation of one appointment and the declaration that Dr Johnathan Kool (Australia) would not be seeking a second five-year term. The IOC has selected Kim Picard from Australia and CDR Prashant Srivastava from India to the GEBCO Guiding Committee. Besides, one of the GGC IHO appointed members' position will become vacant on 1 September 2021. With the IHO CL 17/2021 dated 21 April 2021, IHO Member States are therefore requested to consider nominating suitable experts to fill the resulting vacancy.

A virtual intersessional GEBCO Guiding Committee meeting is planned to take place 26 and 27 May to monitor and discuss work plans and other relevant issues. Agenda items will include a plan to establish a sub-committee on Education and Training (SCET), to coordinate the GEBCO Program engagement with the numerous academic institutions offering Ocean Mapping related courses globally and from which the GEBCO does and could benefit, and a GEBCO strategic fundraising plan on opportunities for sponsoring of future ocean mapping activities.

The GEBCO Secretary, Mr David Wyatt (IHO), advised the GGC that he would be completing his term at the IHO Secretariat at the end of September and therefore GGC37 would be his final meeting as GEBCO Secretary, which also coincided with completion of his five-year appointment as GEBCO Secretary. The GGC requested the IHO Secretariat continue to provide secretarial support to the GEBCO program.

As a result of the completion of the terms of the current Chair and Vice-Chair and the confirmation that the current Vice-Chair would not be seeking to step-up to the Chair position, elections were held for both positions. The GGC unanimously elected Mr Evert Flier (IHO-Norway) as Chair and Dr Marzia Rovere (IOC-Italy) as Vice-Chair for the next triennium.

Technical Sub-Committee on Ocean Mapping (TSCOM), Sub-Committee on Regional Undersea Mapping (SCRUM) and the Sub-Committee on Communications, Outreach and Public Engagement (SCOPE)

As a result of the increased interest in ocean mapping and the significant increase in participation at the Sub-Committee meetings and the symposium, it was proposed that a restructuring of the GEBCO week could be considered by the GGC to allow more time to review the various activities and generate more measured future work plans and funding

applications.

Over 500 attendees virtually joined the annual Map the Gaps symposium over the course of five days. More than 80% of the attendees were first time participants. The symposium convener provided an overview of the benefits and disadvantages of holding a virtual symposium, in particular the cost differential of between \$2000 to \$45,000-\$50,000, time zone challenges and lack of interaction and networking opportunities, as well as loss of attention / focus among participants.

At the 2021 meetings, TSCOM continued to investigate ways to provide technical and methodological advice in order to maintain and improve GEBCO products and supporting data. In particular a comprehensive report was received from the Chair of the Metadata Working Group, which included work on the development of the Seabed 2030 metadata schema and the engagement with the Seabed 2030 Regional Centers to review the different metadata services being employed. It was agreed that the main task should be to harmonise the different metadata schemas and provide input to B-11 - GEBCO Cookbook. The Chair of the GEBCO Cookbook Working Group reported on the ongoing investigation on how best to transform the current format into a suitable e-Publication format, for which contract professional assistance may be required. The Sub-Committee agreed to disband the Cookbook Working Group and establish a Cookbook Editorial Board under the leadership of the Dr Karen Marks, the current Chair of the Cookbook Working Group.

The Sub-Committee also received a progress report on the GEBCO website development work and confirmation that all International Bathymetric Chart (IBC) pages and the GEBCO community contact list had been transferred successfully from the IHO Data Center for Digital Bathymetry (DCDB) website. A brief was given on the further development of the GEBCO grid reviewing application as a result of the feedback received. Updates on the production of the annual GEBCO grid and the ongoing developments of the IHO DCDB were followed by a demonstration of a prototype Track Planning application and an explanation on the integration of the Shuttle Radar Topography Mission (SRTM) data into the GEBCO grid.

SCRUM continued to liaise, engage and cooperate with all existing regional mapping efforts relevant to GEBCO products, to foster coordination between relevant regional bathymetric mapping projects and the IHO Data Center for Digital Bathymetry (IHO DCDB) to capture, for long-term archive, the bathymetric data used by these projects and to encourage the establishment of new IHO/IOC regional bathymetric mapping projects to fill current gaps in global bathymetry. In particular reports on progress from the groups involved with the IBC for the Arctic Ocean (IBCAO), the IBC of the Southern Ocean (IBCSO) and the IBC of the Caribbean Sea and the Gulf of Mexico (IBCCA) were received, all of which included increases in percentage coverage due to the receipt of additional data.

The engagement with the IHO Crowdsourced Bathymetry Working Group (CSBWG) and the various Regional Hydrographic Commissions were noted and a number of regional projects and initiatives were highlighted, including AusSeabed and work with the Schmidt Ocean Institute vessel RV *Falkor* around the Australian coast, various projects in Canada and an initiative to restart the South East Pacific Bathymetric Chart through collaboration between the South East Pacific Regional Hydrographic Commission (SEPRHC) member states. Activities in China, Ireland, USA and Europe under the European Marine Observation and Data Network (EMODnet) were presented.

SCOPE continued to support the external relations and communications efforts of GEBCO by developing and advising on communications strategies, developing and reviewing material, and identifying opportunities for engagement with GEBCO's diverse community of stakeholders, to foster coordination and consistency across the external relations and communication activities of IHO-IOC GEBCO sub-committees and projects and to identify the current issues related to the potential usage of GEBCO products and generate publicity. In particular progress on the finalisation of the communication strategy was noted.

The Sub-Committee discussed various elements related to communication and outreach including the development of a generic presentation template and GEBCO slide deck, the current GEBCO Map Production Principles, which it was agreed were in need of review and revision, the need to manage on a full time basis the GEBCO social network presence, the SCOPE website and how to transfer the contents into the main GEBCO website. A proposal to update the IHO publication B-10 - History of GEBCO - in time for the 120th anniversary of GEBCO in 2023 was presented. Initial statistics and analysis of the GEBCO Map the Gaps symposium were provided and the advantages and disadvantages of the online format were discussed.

During the Joint Sub-Committees session, the Work Plans and budget resource bids were discussed; in particular the various tasks and actions identified during the individual sessions were discussed and prioritised. It was proposed to hold the GEBCO week for the Sub-Committees and the Symposium in late October/early November, with the Symposium containing a virtual element to maintain the broad participation at all career levels, which was evident for the solely online version this time. The exact dates and location will be published on the IHO, IOC, GEBCO and Map the Gaps websites when confirmed.

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 program 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 34th meeting of the IHO-IOC Sub-Committee on Undersea Feature Names (SCUFN) was held by video teleconference (VTC) on the 7th of January 2021 due to the COVID19 pandemic.

The meeting, chaired by Dr Hyun-Chul Han (IOC representative) from the Korean Institute of Geoscience and Mineral Resources (KIGAM – ROK), was attended by 29 registered participants, which consisted of eleven of the 12 SCUFN members (four IOC and six IHO representatives) and 16 observers, including Mr Evert Flier, Chair of the GEBCO Guiding Committee (GGC), Marine Regions and representatives of Brazil, Canada, Chile, India, Malaysia, Portugal and Viet Nam. Representatives of KHOA (ROK) in charge of the development and integration of SCUFN operational web services were also present. Director Luigi Sinapi and Assistant Director Yves Guillam (SCUFN Secretary) represented the IHO Secretariat.

The Sub-Committee was able to consider proposals for 150 undersea feature names, submitted by various bodies and supporting organizations from: Canada (2+12), Republic of Korea (3), China (13), New Zealand (12+3), Viet Nam (70), Malaysia (11), Brazil (15+1),

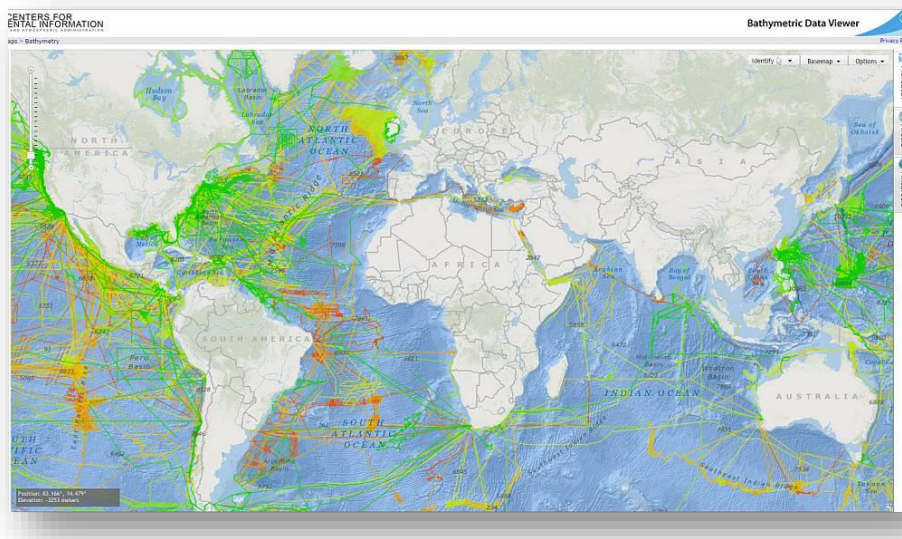
Russian Federation (2), Chile (1), US (1) and Serbia (4). Thanks to the pre-review made by SCUFN members through the scufn.ops-webservices.kr assessment interface, the VTC process led by the Chair was efficient enough to approve 51 names. Most of the other names were kept with the PENDING statute for reasons often encountered in SCUFN meetings: lack of good bathymetric data, absence of mutual consultation between proposer and national naming boards in some specific areas.

The Sub-Committee is also planned to have another VTC meeting on the 7th of June and will discuss the possibility of face to face meeting at Saint Petersburg this November.

2. Additional relevant activities

Operation of IHO Data Center for Digital Bathymetry

Since its inception, the IHO Data Center 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 Oceanic 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 program. 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:

https://maps.ngdc.noaa.gov/viewers/iho_dcdb/

Contribution of bathymetric data to the IHO DCDB

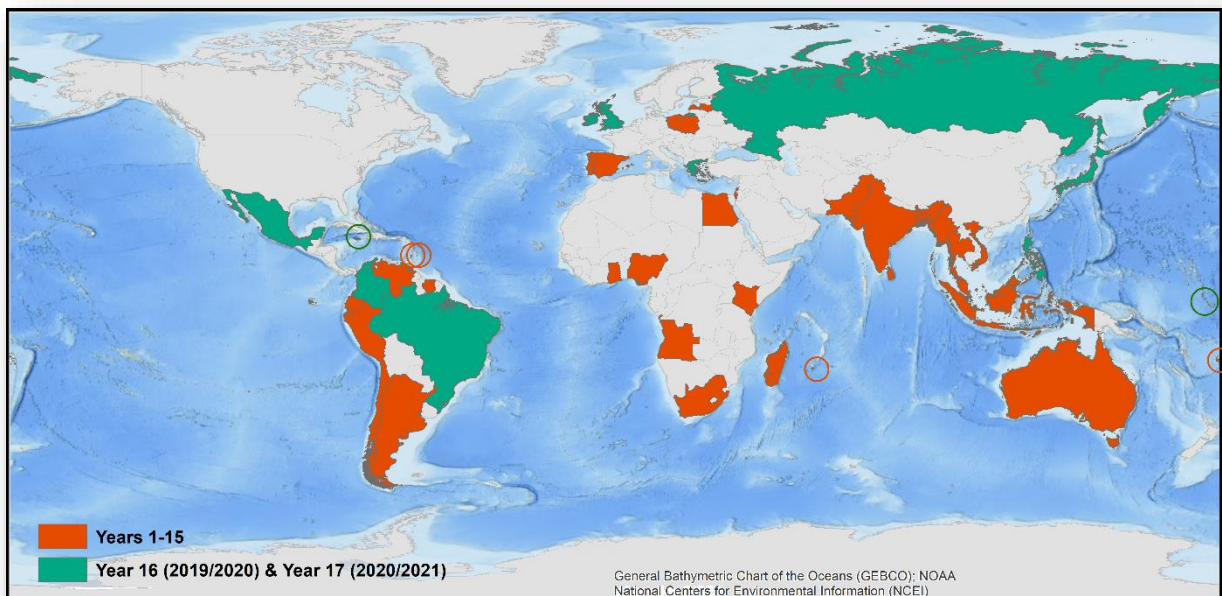
The GEBCO Ocean mapping programme is dependent upon the availability of bathymetric data. In order to achieve its goals, GEBCO actively encourages data contributions from the

bathymetric community. In 2020, GEBCO, in collaboration with the DCDB, stood up a new Data Contribution webpage (gebco.net/about_us/contributing_data/) to simplify the answer to the often-asked question, “how can I contribute data?” GEBCO has also worked towards improving its participation in regional mapping activities by attending most IHO Regional Hydrographic Commission (RHC) meetings.

Traditionally GEBCO has focused on areas deeper than 200 m, however, its focus has expanded to data gathering 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.

GEBCO Training Program

The Nippon Foundation / GEBCO Training Program leading to a Graduate Certificate in Ocean Mapping from the University of New Hampshire continues to be funded by the Nippon Foundation, with funds for Year 18 (2021/2022) confirmed in March 2021. The Training Program at the Center for Coastal and Ocean Mapping/Joint Hydrographic Center has produced 102 alumni from 43 coastal states to date. These alumni continue to take home their gained knowledge to build skills in their home organizations and beyond.



Distribution of Alumni of the Nippon Foundation / GEBCO Training Program

The GEBCO-Nippon Foundation Alumni Team, a team led by alumni of the Nippon Foundation / GEBCO Training Program, were declared grand prize winners of the Shell Ocean Discovery XPRIZE in May 2019. Following this success, the alumni continue to self-organize themselves underneath the Map the Gaps non-profit in order to do work around the world and grow their skills and to support each other, as well as GEBCO and Seabed 2030 projects.

Seabed 2030 Project

The Nippon Foundation-GEBCO Seabed 2030 Project (Seabed 2030) is now in its 4th year of operation. For a significant part of the reporting period, much activity has been undertaken whilst set against the global backdrop and challenges of the COVID global pandemic; and has allowed a demonstration of the true resilience of the geographically dispersed Project Team members who have shown real strength in overcoming the disruption of remote working to provide continuity of activities across the majority of work streams.

Team members, supported by others within the GEBCO community, have been able to participate in a large number of national and international fora at all levels: in person in the early part of the reporting period; and, in spite of COVID-related disruption, at virtual events in the latter part. Complementing these engagement opportunities, and within a revised Project Media Strategy, there has been an increase in publication of material across mainstream and social media channels, and within the period newsletter. Overall, this has allowed the Seabed 2030 message to be broadcast, calls for action to be made, and industry and technical engagement to take place thus maintaining the engagement theme, amongst an extensive network of partners, contributors and supporters. An additional, and important, engagement strand has been the launch of Community Survey to seek user views that will allow the Project to better collate and quantify the value and benefits of seabed mapping and to identify user-defined priority areas. Again, this has further raised awareness of Seabed 2030 across a wider of community of organisations and individuals that use geospatial data. First launched in mid-2020, the survey recorded input from some 366 respondents, a number of whom had data to contribute. Based on this success, it was launched for a second time in February 2021 and will run for 5 months.

Building on this Ocean Frontier Mapping success, Seabed 2030 has partnered in separate mapping activities, in the Atlantic and Pacific Oceans, with Seakit, Saildrone and Caladan Oceanic; benefitting in new data acquisition either via incremental mapping days or provision of sonar operators (where none exist on board) for transit legs. These activities, generously offered by Seabed 2030 partners, cannot replace the mission-essential need for wholesale wide-area surveys in remote regions. However, they do deliver a hugely cost-effective method of gathering discrete quantities of important data in otherwise unmapped areas.

Separately but related, the Project is proud to be associated with the Schmidt Ocean Institute, and the work of Research Vessel FALKOR, that collected the first public seafloor data of 2021 in support of Seabed 2030 and the UN Decade of Ocean Science. The Project has also had significant transit bathymetry contributions from key industry partners including Fugro and PGS.

To encourage collaboration in CSB, and working closely with IHO's DCDB and other IHO experts, the Project has rolled out a number of data loggers in Greenland, Palau and South Africa. This is to demonstrate the ease and utility of gathering such data and also to encourage wider participation in collection. The activity is greatly reliant not only on the goodwill of those marine stakeholders who have offered to embark the loggers but also on the support of key country stakeholders who will engage with vessel operators, oversee the rollout and assist in the subsequent harvesting of data.

Innovation strategy work is still ongoing and the Team has been active in engaging across a broad sector of technical stakeholders to determine future areas of collaboration and opportunity. In addition to collection of data and gridding, focus areas also include use of web services for handling big data. Within the Project, innovative work has seen development of a new statistics tools that allow a speedier and even more accurate assessment of mapping progress.

The value of the Nippon Foundation-GEBCO Training Program Alumni to the field of ocean mapping, and more specifically to Seabed 2030, is widely recognised. There has been extensive discussion on ways of involving individuals within the Project and some have already been greatly involved out Ocean Frontier Mapping activities. Work is well advanced to establish a new post within the Project that will deliver a comprehensive plan that utilizes the skills and experience of members of the Alumni to support a wide range of Seabed 2030 activities.

Invaluable work pioneered by the Centers Heads has continued apace on a range of work that includes the publication of IBCAO v4.0; progression of IBCSO v2.0 revisions; and leveraging tools to improve multibeam integration. Development and subsequent delivery of a new type identifier (TID) grid was a significant achievement; as was delivery of the download app which has resulted in a 10-fold increase in user download requests in 2020. In addition to the technical skills, experience and gravitas required to do the job and to represent Seabed 2030, the Center Teams have significant expertise in engagement and have well developed, and increasing, networks of contacts and contributors that continue to support the Project. DCDB continues to strongly support the Project not only in CSB field trials but also with crucial data ingestion and improvements in the data submission process.

Whilst much crucial work happens behind the scenes at the Centers, the most acclaimed and visible output has been publication of the GEBCO Grids. Within this reporting period, the 2020 GEBCO Grid release saw an increase from 15% to 19 % of ocean floor mapped. It is worthy of note that a large proportion of data contributed was already archived but had yet to be incorporated in the Grid. Whilst there have been “newly gathered data” contributions in both 2019 and 2020, there is still much more to be gathered to achieve the 2030 Mission. On current assumptions, the forecast for the 2021 Grid release will be around 21% of ocean mapped.

Collaborative work and professionalism are evident amongst the Team and, the Project continues to receive the welcome leadership and support from The Nippon Foundation, GEBCO, IHO and IOC. Without losing sight of the huge resource implications in achieving the mission to deliver 100% mapping of the seabed by the year 2030, Seabed 2030 is well placed to continue work that supports UN Sustainable Development Goal 14 and is a programme within the UN Decade of Ocean Science for which it is a foundational pillar.

Bathymetric publications

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

Since 1990, 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. For the last several years, the DCDB has also become the international repository for

crowdsourced bathymetric data (CSB). CSB is defined as is the collection of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations. CSB can be used to supplement the more rigorous and scientific bathymetric coverage done by hydrographic offices, industry, and researchers around the world.

These data can be viewed and accessed from: maps.ngdc.noaa.gov/viewers/iho_dcdb/. 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.

- B-6 - Standardization of undersea feature names

Edition 4.2.0 of Publication B-6 on the Standardization of Undersea Feature Names entered into force in October 2019. This publication provides guidelines for naming features, a naming proposal form and a list of generic terms with definitions with significant clarifications and improvements compared to the previous Edition that was issued in 2013. The work continues within SCUFN to improve the geometric parameters of some specific features (Seamount versus Ridge for instance) but nothing is mature enough to move to another Edition of B-6 yet.

Following the general guidance provided by the GGC, SCUFN confirmed the need in 2020 to further develop a general strategy and possible guidelines defining the optimal horizontal resolution between undersea features that are eligible for naming (and also to prevent from some inflation). The following general principles were agreed:

“The areal size of an undersea feature should generally be identified on the GEBCO gridded bathymetric map between 60°S and 60°N and in the IBCSO and IBCAO maps below respective above these latitudes. Features not shown at these gridded bathymetric maps, it should be an important landmark of science or hydrography” ...

A policy paper is to be drafted and the rules experimented. This document will define the current resolution of the GEBCO gridded product and the future goal of the gridded product as it moves towards a variable resolution, as a supportive action to GEBCO and Seabed 2030 Project.

- B-8 - GEBCO Gazetteer of Undersea Feature Names

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), NOAA), was maintained by the IHO Secretariat through contract support. Some maintenance issues were fixed in 2019 by the NOAA, USA.

In 2020, all outstanding issues identified mainly by the SCUFN Secretariat were addressed by NOAA in a version 4.2.0 of the GEBCO Gazetteer. Plans were made to develop a new version 5.0 in spring 2021 aiming to integrate, through an API, NOAA and KHOA SCUFN web services. KHOA also prepared the development of a repository where all SCUFN Data Archive will be stored in the future; the migration is planned from the IHO website to the new repository, after experimentations to be conducted in 2021.

- B-9 - GEBCO Digital Atlas

IHO publication B-9 - GEBCO Digital Atlas (GDA) is currently outdated and will be replaced by a new publication describing the GEBCO global gridded product and the GEBCO Grid Web Map Services.

- B-10 - History of GEBCO

The history of GEBCO was published in 2003 to celebrate 100 years of GEBCO. SCOPE has started the work on updating the GEBCO history for its 120 year celebration in 2023.

- B-11/IOC Manuals and Guides, 63 - GEBCO Cook Book

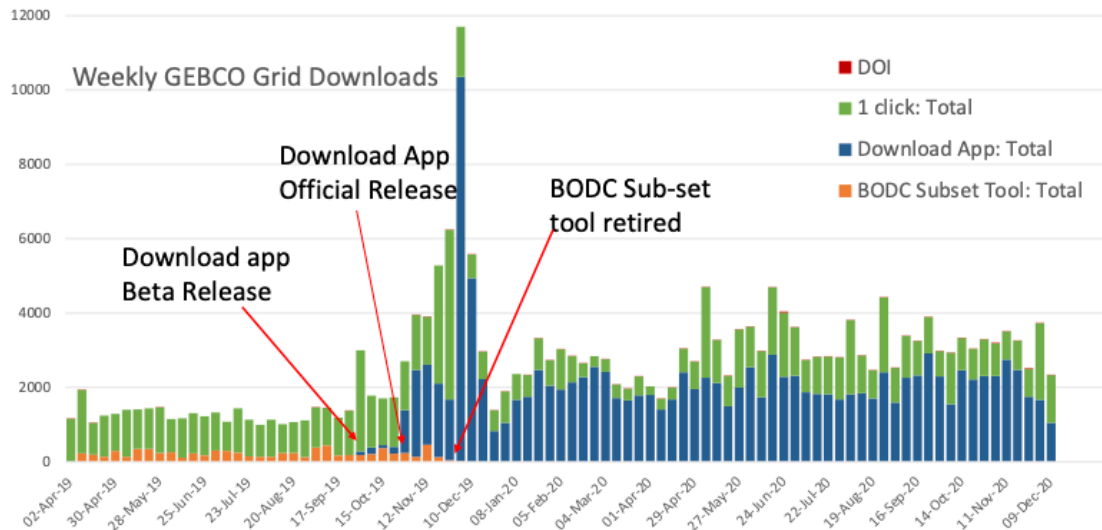
The GEBCO Cook Book (IHO publication B-11) is a technical reference manual that has been developed to assist and encourage participation in the development of bathymetric grids. It is an important GEBCO reference document that is used by academic institutions and hydrographic organizations. The Cook 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 brochure was first released as IHO Publication B-11 in April 2012 and as an IOC guide document in October 2012. It is planned to convert the current pdf version into an e-Publication, which will enhance its usability, ease the maintenance task and allow for a more flexible presentation. This work is planned to be completed in 2021.

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>. 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 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. Utilising funding from the Seabed2030 Project, a dedicated download application has been developed. The application is hosted on a cloud server (<https://download.gebco.net>) to provide a sub-setting service for the GEBCO global grid. Since the introduction of this new service, there has been a three-fold increase in the total number of downloads, with more users choosing to download regional subsets, and fewer users downloading the full global grid, indicating this is a more efficient solution for most users.



There were 139,255 downloads of the full, or partial, grid between 1 Oct 2019 and 30 Sep 2020.

The GEBCO website also provides access to the world grid via a Web Map Service (WMS).

3. Progress on IRCC Action Items

There were no specific actions on the GGC from IRCC11.

4. Problems Encountered

While only two percent of the world's total budget on science is spent on ocean related science, global attention to our oceans and coastal waters is growing. With that comes increased visibility on the activities of the IHO (and IOC) and its member states. All members of the United Nations have endorsed the United Nations Decade of Ocean Science for Sustainable Development. One of the strategic goals of the UN Decade for Ocean Science is to create a comprehensive map of the entire ocean seafloor and to have this knowledge publicly available for mankind. The quest of the growing GEBCO community to improve seabed knowledge and make it publicly available faces many challenges but top level there are only two: 1. Increase external funding for ocean mapping activities to map the remaining 80 percent of the world's seafloor yet unmapped; 2. Increase accessibility to existing bathymetric data sets currently not yet publicly accessible. Bearing in mind the endorsement of all UN member states of the UN Decade of Ocean Science, GEBCO would like to ask all RHC to put this challenge nr. 2 on their agenda and ask member states to either share data at the highest possible resolution while adhering to national regulations or, even better, review their national regulations as they might have been established in the past for purposes that might be less relevant today. The question of whether or not to allow sharing of bathymetric data should not be answered with a simple yes or no. Instead, we should ask in which way bathymetric data can be shared. If not at a 100m grid resolution, what about a 200m grid resolution? At what level is bathymetric data no longer either commercially or military-strategically relevant so that we can contribute to a better knowledge of our oceans, a better understanding of our planet and help improve climate change models? Hydrographic Offices tend to be the authoritative agency for a government on any hydrographic or bathymetric related issues and can and should therefore play an active role to positively influence all processes relevant for making bathymetric data more widely accessible.

5. Any Other Items of Note

None.

6. Conclusions and Recommendations

None.

7. Justification and Impacts

None.

8. Actions Required of IRCC

The IRCC is invited to:

- a. **Note** the contents of this report;
- b. **Continue** to encourage RHCs to organize contribution of bathymetric data to GEBCO in order to support improved and accessible knowledge of the world's oceans' floor;
- c. **Encourage** RHCs to invite and communicate with GEBCO members to their meetings as appropriate; and
- d. **Take** any actions deemed necessary.

**IHO-IOC GEBCO GUIDING COMMITTEE
(GGC)**

List of GGC members - 24 February 2020

- | 1. IHO Appointed Members: | Term Period: |
|--|---------------------|
| Mr Shin Tani (Japan) | (2018-2023) |
| Mr David Millar (USA) | (2018-2023) |
| Mr Evert Flier (Norway) (<i>Chair</i>) | (2019-2024) |
| Captain Rodrigo de Souza Obino (Brazil) | (2019-2024) |
| Mr Samuel Harper (UK) | (2020-2025) |
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| 2. IOC Appointed Members: | |
| Dr Martin Jakobsson (Sweden) | (2018-2023) |
| Dr Karolina Zwolak (Poland) | (2018-2023) |
| Dr Marzia Rovere (Italy)* (<i>Vice-chair</i>) | (2019-2024) |
| Ms Kim Picard (Australia) | (2021-2026) |
| Commander Prashant Srivastava (India) | (2021-2026) |
|
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| 3. Ex-officio Members: | |
| Dr Vicki Ferrini (USA) (<i>Chair of SCRUM</i>) | |
| Mr Thierry Schmitt (France) (<i>Chair of TSCOM</i>) | |
| Mr Hyun-Chul Han (Republic of Korea) (<i>Chair of SCUFN</i>) | |
| Dr Hyo Hyun Sung (Republic of Korea) (<i>Chair of SCOPE</i>) | |
| Ms Jennifer Jencks (USA) (<i>Director of IHO-DCDB</i>) | |
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| * Members serving a second 5-year term. | |
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| 4. Secretary: | |
| Mr David Wyatt (IHO) | (2015-2021) |

NOTE: Members of the Secretariats of the IHO and IOC are permanent non-voting Members in the Committee.

1. IHO-IOC GEBCO Guiding Committee (GGC) Work Plan 2021-2022

1.1 GGC Tasks

- A Organise and conduct GGC XXXVIII meeting in 2022 (IHO Task 3.6.1)
- B Ensure conduct of TSCOM, SCRUM, SCOPE and SCUFN meetings in 2021 (IHO Tasks 3.6.1)
- C Ensure effective operation of IHO DCDB (IHO Task 3.6.2)
- D Encourage the contribution of bathymetric data to the IHO DCDB (IHO Task 3.6.3), identify priority areas for regional mapping (IHO Task 3.6.3) and promote data contribution through GEBCO participation in IHO/IOC Regional meetings (IHO Task 3.6.3)
- E Maintain IHO bathymetric publications (IHO Task 3.6.6) including: B-4, B-6, B-8, B-9, B-10 and B-411
- F Develop the on-line function of B-4 (Information concerning recent bathymetric data) (IHO Task 3.6.6)
- G Contribute to outreach and education about ocean mapping (IHO Task 3.6.7) by development of outreach and educational materials (IHO Task 3.6.7) and printing of IHO-IOC GEBCO World Map (IHO Task 3.6.7)
- H Ensuring IHO-IOC GEBCO Web site is kept current and updated regularly (IHO Task 3.6.8)
- I Develop short course and course material on compiling digital bathymetric models (DBMs) to be included in GEBCO from a heterogeneous bathymetric source database (IHO Task 3.6.9)
- J Update and enhance the GEBCO Gazetteer (B-8) for internet access (IHO Task 3.6.10) including providing the GEBCO Gazetteer as a web service via a geospatially enabled database (IHO Task 3.6.10), develop and make available public and management on-line interfaces to the Gazetteer (IHO Task 3.6.10) and develop the integration of undersea feature concepts in the S-100 framework
- K Liaise with and provide support to Seabed2030 project (IHO Task 3.6.5)
- L Provide support and advice to developing and validating emerging technologies for compiling and disseminating bathymetry

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
A	Organise and conduct GGC XXXVIII meeting	H		2021	2022	P	Chair GGC Sec		0	0
B1	Ensure conduct of TSCOM, SCRUM, SCOPE and SCUFN meetings	H		2021	2021	P	Chair GGC, Chair, TSCOM, Chair SCRUM, Chair SCOPE and Chair SCUFN		0	0

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
B2	Oversee work of subordinate bodies – TSCOM, SCRUM, SCUFN and Outreach WG – for completion of directed tasks	H		Continuous	Continuous	O	Chair GGC		0	0
C	Ensure effective operation of IHO DCDB	H		Continuous		O	Director DCDB		0	0
D1	Encourage the contribution of bathymetric data to the IHO DCDB	H		Continuous		O	All members of GEBCO GC through the Chair		0	0
	Document data flow processes	H	B-11 instructional chapter	Continuous		O	Chair TSCOM, Director DCDB, Director Seabed 2030			
D2	Identify priority areas for regional mapping and support the organization of regional mapping projects.	H		Continuous		O	Chair SCRUM		0	0
	Conduct DCDB Industry Day and Data Contribution Workshop	H	Conduct Workshop	2020	2021	P	Chair TSCOM, Director DCDB		0	0
D3	Promote data contribution through GEBCO participation in RHCs and IOC regional meetings	H	Identify GEBCO people who are able to attend for meetings in 2021 – 2022	Continuous		O	All members of GEBCO GC through the Chair		10,000	10,000

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
D4	Organize regional mapping meetings/workshops	H		Continuous		O	Chair SCRUM		0	0
	Promote data contribution by supporting participation at Regional Mapping Meetings	H	Provide partial support, as necessary, for individuals to participate in regional mapping meetings	Continuous		P	Chair SCRUM		0	0
D5	Develop material to highlight activities and initiatives including up to date GEBCO slide deck	H		Continuous		P	Chair SCRUM in coordination with Chair SCOPE and with input from Seabed 2030		6,000	6,000

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
E1	Maintain IHO bathymetric publications	M	Update GEBCO global 30 arc-second grid with new compilations	Continuous	Continuous	O	All members of GEBCO GC through the Chair	B-4 - Information concerning recent bathymetric data	0	0
		M		2016	2017 2021	O	Chair SCRUM	B-9 - GEBCO digital atlas	0	0
		M	Update GEBCO World Map to include updated versions of GEBCO grid and adopted undersea feature names from SCUFN.	2017	2018 2021	O	Chairs SCRUM/SCUFN	B-6 – Standardization of undersea feature names B-8 - Gazetteer B-9 - GEBCO digital atlas	0 0	0 0
		L	Update B-10					B-10 - The history of GEBCO	0	0
		H		2021	2023	P	Jaya Roperez	B-10 – History of GEBCO	2,000	2,000

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
E2	Add and update instructive chapters in IHO-IOC GEBCO Cook Book	H	Maintain B-11 2019 B-11 update Add section related to Seabed 2030 Investigate e-Publication format for B-11 Seek instructive chapters on contributing data, metadata requirements, platforms for viewing gaps and coverage, CSB, etc.	Continuous 2018 2019 2019 2019	 2021 2021 2021 2021	O C O P O	Chair TSCOM Chair, Cookbook Working Group	B-11 GEBCO Cookbook	 2,000	 2,000
F	Develop and review the on-line function of B-4	M	Conduct review	2015	On going		Director DCDB		0	0
G1	Development of SCOPE webpage	H		2018	2025	O	Chair of SCOPE		(5,000)	5,000
G2	Communication Strategies	H		2019	2025	O	Chair of SCOPE		(4,000)	4,000
G3	PPT materials with proper content and PR activities	H		2019	2025	O	Chair of SCOPE		(1,000)	1,000

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
G4	Update GEBCO Publication B10 for GEBCO 120 th year celebration	H		2021	2023	P	Hyo Sung		(2,000)	2,000
G5	External Relations and Communications	H	Draft and update strategy plan	2019	2025	P	Eunmi Chang		(8,000)	8,000
H1	Ensuring IHO-IOC GEBCO and Seabed 2030 Web sites are kept current and updated regularly	M	Complete individual tasks	Continuous		O	BODC, Chairs TSCOM/SCRUM/SCOPE		5,000	5,000
H3	Review and Update IHO-IOC GEBCO and Seabed 20230 Websites	M	Update website with meeting documents	2019	2021	P	BODC		10,000	10,000
			Validate members and contact information for SCRUM, TSCOM, and SCOPE	2019	2021	P	Chairs TSCOM, SCRUM, SCOPE			
			Review and maintain all working links	2019	2021	P	Chair TSCOM, BODC			
	Provide technical and content review of both websites	2019	2021	P	Chairs TSCOM, SCRUM, SCOPE					
I	Develop short course and supporting material on compiling digital bathymetric models	H		2019	2021	P	All members of GEBCO GC through the Chair SCOPE		0	0
J1	Update and enhance the GEBCO Gazetteer (B-8) for internet access	H		Annual	Annual	O	Chair SCUFN	B-8 – Gazetteer	15,000 /year	Funded out of IHO Operational funds

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
J2	Maintain the GEBCO Gazetteer as a web service via a geospatially enabled database	H		2016	Permanent	O	Chair SCUFN Director DCDB	B-8 – Gazetteer	(See Doc. SCUFN32-07.1B). Funding for correcting and basic maintenance agreed by US. Need to keep it maintained.	
J3	Develop and make available public and management on-line interfaces to the Gazetteer	M		2014	2018 2022	O	Chair SCUFN KHOA	B-8 - Gazetteer Management Plan	0	0
J4	Develop a S-100-based product specification for Undersea Feature Names	M / L		2015	2021	O	Chair Project Team (Anna Hendi)	S-100, B-6 Harmonized definitions of generic terms across B-6, S-32, IHO GI Registry	0	0
J5	Upgrade the quality of the geometry of major existing undersea features in the Gazetteer which are known as being inaccurate and ambiguous	M	10 features/ SCUFN member per year	2017	Permanent	P	SCUFN Members	B-8 Gazetteer	0	0
K1	Support Seabed2030	H	Provide scientific expertise, regional connections and outreach	2018	2030	P O	Chairs TSCOM, SCRUM, SCOPE, SCUFN	See TSCOM and SCRUM WPs 2019-2020	0	0
K2	Travel to assist gathering technical needs from RDACCs and GDACC	H	Attend RMCs for RDACCs	2021	2022	O	Chair TSCOM		0	0

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard	Funding Bid (€)	Approved Funding (€)
K3	Provide oversight and review of Seabed 2030 web services, methodologies and applications in accordance with TSCOM ToRs	H	Conduct regular reviews and participate in technical meetings	2019	2021	P	Chair TSCOM			
K4	Develop and implement a Seabed 2030 Fundraising Strategic Plan	M	Provision for professional consultancy services as required	2020	2022	O	Chair FRWG		20,000	20,000
L1	Develop template for seafloor mapping route optimization application	H	Conduct requirements survey Prototype and document web app	2019	2021	P	Chair TSCOM		10,000	10,000

1.2 GGC Meetings (IHO Task 3.8.1.1 refers)

Date	Location	Activity
1-4 October 2012	IHB, Monaco	XXIX th Meeting
7-11 October 2013	Venice, Italy	XXX th Meeting
13-15 June 2014	IHB, Monaco	XXXI th Meeting
5-9 October 2015	Kuala Lumpur, Malaysia	XXXII th Meeting
10-14 October 2016	Valparaiso, Chile	XXXIII th Meeting
13-17 November 2017	Busan, Korea	XXXIV th Meeting
5-9 November 2017	Canberra, Australia	XXXV th Meeting

7-8 November 2019	Portsmouth, NH, USA	XXXVIth Meeting
18-20 January 2021	Virtual meeting	XXXVIIth Meeting
January/February 2022	IHO, Monaco	XXXVIIIth Meeting

Chair: Evert Flier	Email: Evert.Flier@kartverket.no
Vice-Chair: Marzia Rovere	Email: m.rovere@ismar.cnr.it
Secretary: David Wyatt	Email: adso@iho.int

IHO PUBLICATIONS AND RESOLUTIONS

Publications and Resolutions for which GEBCO is the lead or subject matter expert:

Title	IHO Number	IOC Number	Edition/date
<i>Standardization of undersea feature names</i>	B - 6	-	Edition 4.1.0 September 2013; new Edition 4.2.0 in preparation
<i>Gazetteer</i>	B - 8	-	V1.1.1
<i>GEBCO Digital Atlas</i>	B - 9	-	08 Grid March 2015
<i>The History of GEBCO</i>	B-10	-	April 2003
<i>GEBCO Cookbook</i>	B-11	Manuals and Guides 63	October 2019

Resolution3/1929 as amended (*Centralization of oceanic soundings*);
 Resolution3/1932 as amended (*Collecting oceanic soundings*);
 Resolution4/1932 as amended (*Metadata for oceanic soundings*);
 Resolution2/1962 as amended (*Oceanographic observations*); and
 Resolution8/1962 as amended (*Oceanographic information*).

AREAS WHERE ENC SOUNDING DATA HAVE BEEN PROVIDED TO GEBCO

