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INFORMATION DOCUMENT

REPORT OF THE GEBCO GUIDING COMMITTEE TO THE IOC ON ITS ACTIVITIES
(2022–2023)

Summary

The GEBCO is an IHO and IOC Programme, which is guided by the Joint IHO-IOC GEBCO Guiding Committee, made up of representatives from both IHO and IOC and 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 Sub-Committee on Education and Training (SCET). 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>.

The progress of the GEBCO programme is reported below.

Introduction

The GEBCO is an IHO and IOC Program, which is guided by the Joint IHO-IOC GEBCO Guiding Committee (GGC), made up of representatives from both IHO 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 Sub-Committee on Education and Training (SCET). 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>. The progress of the GEBCO program is reported below.

GEBCO started in 1903 and will continue after 2030. Whereas the GEBCO programme through its long history and until recently has been referred to as the GEBCO project, it makes sense to start referring to it as the GEBCO program.

During the period covered 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's 2030 Agenda for Sustainable Development Goals, The Paris Agreement under the UN Framework Convention on Climate Change, the Sendai Framework for Disaster Risk Reduction 2015-2030, the UN Decade of Ocean Science for Sustainable Development (2021-2030) and most recently, the historic new UN High Seas treaty (BBNJ), 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 and is now a UN Decade endorsed program, 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 DCDB being identified as the preferred raw data store. The long-running GEBCO program, 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 annual updated GEBCO grid.

GEBCO leadership

GEBCO Guiding Committee:

Chair - Mr Evert Flier (Norway – IHO) from January 2021
 Vice-Chair - Dr Marzia Rovere (Italy – IOC) from January 2021
 Secretary - Mr Sam Harper (IHO)

Sub-Committee on Undersea Feature Names (SCUFN):

Vice-Chair – Dr Yasuhiko Ohara (Japan – IHO) is currently the Acting Chair

Technical Sub-Committee on Ocean Mapping (TSCOM):

Chair – Mr. George Spoelstra (Netherlands)
 Vice-Chair - Ms Federica Foglini (Italy)

Sub-Committee on Regional Undersea Mapping (SCRUM):

Chair - Ms Aileen Bohan (Ireland)

Vice-Chair – Mr.Hugo Montero (Peru)

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

Chair – Mr Tim Kearns (Canada)

Vice-Chair - Professor Eunmi Chang (Republic of Korea) from November 2019

Sub-Committee on Education and Training (SCET):

Chair – Dr Paul Brett (Canada)

Vice-Chair – Dr Rochelle Wigley (South Africa)

Meetings of relevant GEBCO bodies

GEBCO Guiding Committee

The 38th meeting of the GEBCO Guiding Committee (GGC) was held from 20 to 22 April in Monaco 2022 and the 39th meeting of the GEBCO Guiding Committee (GGC) was held in Southampton, United Kingdom from 31 October to 1 November. Both meetings were chaired by Mr. Evert Flier.

At its 38th 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 community and the general public. The GGC reviewed the draft communications strategy and approved SCOPE to commence work in line with the proposed strategy. The GGC devoted considerable time on discussions on the Seabed 2030 Project. The acting 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 4 Seabed 2030 Project report and the proposed Year 5 Project Work Plan and both were endorsed after inclusion of some amendments and recommendations.

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 revised allocations to ensure a suitable contingency balance was maintained for 2022 to cover emergent items. The draft consolidated GEBCO Work Plan and budget was reported to the 14th meeting of the IHO Inter-Regional Coordination Committee (IRCC) and the 54th meeting of the IOC Executive Council, for consideration and endorsement of the parent organizations.

At its 39th 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 has completed the 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. See Annex A

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

15th meeting of the IHO Inter-Regional Coordination Committee (IRCC) and the 32nd 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 IHO appointed vacancies and one IOC appointed vacancy. The IHO has elected Geoffroy Lamarche from New Zealand and Yerinelys Santos from Colombia and the IOC has elected Dr Paul Brett from Canada for the GEBCO Guiding Committee.

A virtual intersessional GEBCO Guiding Committee meeting took place 31 March 2023 where work plans and funding allocations for GEBCO sub-ordinate bodies were addressed as well as a status update to the new GEBCO strategy and the GEBCO governance review were discussed.

The IHO 3rd Assembly took place 2 to 5 May with considerable attention to the 120 year anniversary of GEBCO. His serene highness, Prince Albert II of Monaco opened the IHO 3rd Assembly and received a new GEBCO map from the GGC chair, 120 years after his great-great-grandfather, Prince Albert I of Monaco started GEBCO. During a thematic session on ocean mapping, Mr. Mitsuyuki Unno from the Nippon Foundation, GGC Chair, Mr. Mark Heine as CEO of global survey company Fugro and Mr. Jamie McMichael-Phillips as director Seabed 2030 presented past achievements and future ambitions for ocean mapping.

Mr Sam Harper (IHO), started as GEBCO secretary from GGC38 for a five-year period.

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).

Due to the Covid-19 pandemic, the 34th meeting of the IHO-IOC GEBCO Sub-Committee on Undersea Feature Names (SCUFN), initially scheduled in Saint-Petersburg, Russian Federation, was re-arranged through 3 video-teleconferences (VTC) of 3-hour sessions each on 7 January (VTC01), 7 June (VTC02) and 16-17 November 2021 (VTC03). All together, these series of VTC sessions constitute the 34th meeting of SCUFN.

The meeting was chaired by Dr Hyun-Chul Han (IOC representative) from the Korean Institute of Geoscience and Mineral Resources (KIGAM – ROK). VTC01 was attended by about 30 registered participants, with 10 SCUFN Members out of 12. Observers and subject matter experts from Brazil, Chile, China, India, Japan, Malaysia, Portugal, Republic of Korea and Viet Nam and Mr Toshihiko Chiba from the Marine Policy and Regional Coordination Section of the Intergovernmental Oceanographic Commission of UNESCO also participated in the VTC01 session. Director Luigi Sinapi and Assistant Director Yves Guillam (SCUFN Secretary) represented the IHO Secretariat. Due to the nature of SCUFN, it soon became apparent that it was too complicated to run such short VTC sessions with so many participants making important statements that could not be addressed in the allocated time. It was therefore decided that participation in VTC02 and VTC03 should be restricted to SCUFN.

SCUFN received a significant number of naming proposals in 2021:

- For VTC01, submissions were received from Canada (2+12), Republic of Korea (3), China (13), New Zealand (12+3), Viet Nam (70), Malaysia (11), Brazil (25+1), Russian Federation (2), Chile (1), United States of America (1) and Serbia (4).
- For VTC02, submissions were received from Japan (28), Japan-USA (4), United Kingdom (1), United States of America (90) and China (27).

- For VTC03, submissions were received from the Philippines (25+5), Russian Federation (1), United States of America (2), New Zealand (12+1), Brazil (8), Chile (1), Viet Nam (67) and China (56+9).

Out of these 497 naming proposals, only 77, assessed as presenting no significant issues, were directly accepted by SCUFN Members. All the others were either deferred (187), not accepted (6) or kept as “pending” (227). Most of the proposals considered pending are those having the related undersea features located in sensitive maritime areas where mutual consultation by all interested parties is highly recommended by SCUFN in accordance to B-6 Guidelines. The cumulated experience suggests that normally consensus cannot be reached without previous consultation. Subsequently, the pending proposals are stored for 2 years only in the SCUFN archive.

In order to escape from this critical situation and tentatively build a more robust decision-making process, the SCUFN Secretary, supported by the Chair and Vice-Chair, offered to design a “decision tree” based on the location of naming proposals (within national EEZ limits, in ECS, official limits, claimed, disputed, etc.). This experimental process was developed prior to VTC02, but was put on hold due to serious and sensitive concerns raised by some SCUFN Members that could not be discussed efficiently via emails or in VTC meetings only. At VTC03, SCUFN voted to continue this development for being explained and discussed at SCUFN-35 in 2022 and then tested for a couple of future SCUFN meetings.

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 77 naming proposals as indicated above. Among those names, one should note that the work of two outstanding scientists was recognized by SCUFN this year.

The Sub-Committee also faced a situation this year by which several “corporate” issues could not be addressed “in-depth” during the sessions (SCUFN Archive and Repository, interoperability with the GEBCO Gazetteer operated by NOAA, interface for direct submission by proposers, etc.). At VTC03 however, SCUFN agreed to amend the definitions of some decision criteria used in the outcome of naming proposals reviews (ACCEPTED, ADOPTED, NOT ACCEPTED, PENDING).

Due to the backlog induced by the pandemic situation, the Sub-Committee agreed to plan two full in-person sessions for SCUFN-35 in 2022:

- Part 1 – hosted by the Intergovernmental Oceanographic Commission of UNESCO (IOC), at their headquarters in Paris (hybrid format), from 14 to 18 March 2022;
- Part 2 – hosted by the IHO Secretariat in Monaco (in-person format), from 28 November to 2 December 2022.

The meetings were chaired by Dr Hyun-Chul Han (IOC Representative) from the Korean Institute of Geoscience and Mineral Resources (KIGAM – Republic of Korea). Assistant Director Yves Guillam (SCUFN Secretary) represented the IHO Secretariat. Technical support for running the meetings was provided by the IHO staff (Mr Rémy Roquefort), and the Project Officer (Mr Insung Park) seconded to the IHO by the Republic of Korea.

- Part 1 was attended by about 51 registered participants (18 in-person), with 10 SCUFN Members out of 12 (5 in-person). Observers, and subject matter experts from, Brazil, China, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Republic of Korea, United States of America, Viet Nam, Marine Regions (also Chair of the S-130 Project Team) and Mr Toshihiko Chiba from the Marine Policy and Regional Coordination Section of the IOC also participated in this Part 1.
- Part 2 was attended by about 24 registered participants, with 8 SCUFN Members out of 12 and observers or subject matter experts from China, Turkey, Japan, Philippines, United States of America, and Vietnam, the US Advisory Committee on Undersea Feature Names (ACUF) and Marine Regions.

SCUFN had a significant number of naming proposals to consider in 2022. Most of them were pending proposals from previous meetings, which were re-submitted after correction or the provision of complementary data and information. Reaching a total number of 334, and in chronological order of reception by the Secretariat, the breakdown of these proposals was: Indonesia (10), USA (882), Philippines (12+9), Germany (15), Republic of Korea (1), China (11+23+60), New Zealand (9), Viet Nam (67), Malaysia (11), Japan (14), and Brazil (4).

With a majority of naming proposals of features located in the South China Sea (SCS), both meetings were affected by strong statements from the representatives of the Coastal States, claiming priority for naming features within the limits of their EEZ and ECS, most of these limits being disputed by others. The participants were reminded by the Secretary that in accordance with clause I.A of B-6, the international recognition of naming proposals by SCUFN was legitimate as long as the features were located outside the external limits of the territorial sea.

Since 2014, many naming proposals, although technically reviewed and accepted by SCUFN in general, have therefore been kept as “pending” in application of the clause D.III in Publication B-6 by which proposers are invited to engage in mutual consultation for features located in mutual areas of interest. It turned out that there was at least an implicit consensus by the interested parties not to apply this clause since it is not applicable when limits are precisely disputed. These pending proposals are stored for two years only in the SCUFN archive and the GEBCO Gazetteer database, then deleted if the issue is not solved. In other words, all efforts for improving marine knowledge and GEBCO products are wiped out.

As a consequence, some participants suggested to apply the SCUFN Rules of Procedure 2.10 (RoP 2.10) for the SCS (i.e., undersea feature name proposals that are politically sensitive are not considered). SCUFN agreed that it was a radical option that would simplify SCUFN work for sure, but would certainly flag the full SCS as a “no-go” area for feature naming, creating a precedence in the future for some other disputed areas in the world. In order to avoid this side effect, and after considerable discussions during Part 1, a vote (secret ballot) on the applicability of RoP 2.10 was arranged and SCUFN Members voted almost unanimously for going ahead with the technical review of the naming proposals located in the SCS.

Most of the proposals were accepted from a technical point of view, but also challenged by a Coastal State requesting the application of clause I.D of B-6, since they had already named them (principle of anteriority). Since it was unclear whether these names were already recognized by the scientific community, a sub-group was set up at Part 1 to clarify the criteria by which this principle of anteriority should be used (peer-review international scientific publications for instance). The setting up of this sub-group, supported by approved ToRs, was not completed at the start of Part 2, since the members did not reach a consensus in the drafting process of the ToRs.

To avoid a second postponement of final decisions affecting all the pre-technically-accepted names made at Part 1, SCUFN agreed at the beginning of Part 2:

- - on the main objective of the meeting, being the resumption of the entire backlog, otherwise it would not be possible to accept new proposals in 2023 and onwards;
- - on the decision-making process, which was in good spirit, to only use the Rules of Procedure and Guidelines in force at the beginning of the meeting, providing the acceptance of their intrinsic uncertainties.

Despite numerous statements again, a consensus based on the principle of equal treatment of the proposals wherever the feature is located was reached to move forward.

Out of 334 proposals, 263 names were finally accepted, thanks also to the work achieved by correspondence by SCUFN Members and the Secretariat, between Part 1 and Part 2. Some were rejected for technical reasons and very few still require some mutual consultation due to conflicting

naming proposals affecting the same feature: for these cases, in a good will spirit, SCUFN suggested to the proposers to submit a joint proposal at the next meeting (SCUFN-36).

Despite this substantial progress this does not mean that the road is clear for future proposals. One participant argued that the implicit principle “first come-first served basis” provided a privilege to the nations and organizations who support the activities of their SCUFN Members as they know before all, what and where is submitted for being reviewed. The Secretary reported on the procedure to inform the Coastal States who are listed with a “*” in the SCUFN List of Naming Authorities maintained by the Secretariat on the SCUFN webpage. He also invited SCUFN Members not to encourage implicitly and unconsciously some sort of surveying-undersea feature naming race, as the consequences for SCUFN would become totally unmanageable.

SCUFN also made significant progress on some internal corporate matters and dilemma: future of the Cookbook on Generic Terms, Repository of Typical Cases for decision-making, horizontal strategy for naming features and bathymetric grid resolution, open initial discussion on the possible wave(s) of naming proposals and their impact on SCUFN when automated feature detection tools become robust, naming strategies and minor features, spelling or generic term identified errors in already-named features and their propagation in scientific publications in the future if not modified by SCUFN. The work by correspondence was also regulated (no silence procedure, RoP 2.9 applies).

At the end of SCUFN-35 Part 2, the Chair, Dr Hyun-Chul Han and Dr Marie-Françoise Lalancette stepped down from the SCUFN membership, and Dr Oke Dwiyananda and Dr Hyun Suk Lee, became the two new members. Dr Yasuhiko Ohara, Vice-Chair, became the Acting Chair until completion of the SCUFN-36 meeting in 2023.

Technical Sub-Committee on Ocean Mapping (TSCOM),

The GEBCO Technical Sub-Committee on Ocean Mapping (TSCOM), the Sub-Committee on Regional Undersea Mapping (SCRUM) and the Sub-Committee on Communications, Outreach and Public Engagement (SCOPE) held joint meetings from 4 to 5 November 2019 and 15 January 2021 with the individual Sub-Committees holding two separate sessions each in the period 11 to 14 January 2021. The meetings were chaired by Dr Thierry Schmitt (France, Chair of TSCOM), Dr Vicki Ferrini (USA, Chair of SCRUM) and Professor Hyo Hyun Sung (Republic of Korea, Chair of SCOPE).

At the 2019 meetings the initial sessions covered a number of topics relevant to TSCOM and SCRUM, including an update brief by the Director of the IHO Data Center for Digital Bathymetry (DCDB) and the Chair of the Crowdsourced Bathymetry Working Group (CSBWG), which highlighted recent developments, current projects and future considerations. A comprehensive brief on the Seabed 2030 structure and the activities of the Regional Data Centers were received. A number of new applications were demonstrated, including the Arctic App and the Meso-American and Caribbean Sea Hydrographic Commission (MACHC) Discovery App, both of which greatly assist in gaining a better knowledge of data availability within the applicable region.

The new metadata working group (MWG) chaired by Federica Fogliani (Italy) was introduced showing the aims of the group and the main activities carried out during the year. The results of the questionnaire compiled by the MWG member, about the scope and the usage of Metadata for managing bathymetric data, were shown. The feedback about the Seabed 2030 proposed metadata was explained and discussed during the meeting.

A detailed brief on the B-11 – GEBCO Cookbook – was provided and a number of new chapter titles were identified as well as those existing chapters which needed to be updated. Details of the generation of the GEBCO 2019 Grid were given, in which the new data was highlighted, and the current development state for the 2020 Grid was provided.

Professor Hyo Hyun Sung, Chair SCOPE, presented a detailed update on activities, the proposed GEBCO communications, outreach and capacity building strategies and suggested activities to increase the public engagement with GEBCO and the subordinate Seabed 2030 project. The updating and improvements to the GEBCO and Seabed 2030 websites were noted and the proposal to generate a new world map version from the 2020 Grid was considered.

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.

Over the last year, TSCOM has held two meetings. One virtual (interim) meeting in September 2022 as preparation for the yearly GGC meeting and one (official) meeting at NOC in Southampton during the GEBCO week in November.

TSCOM is currently, in addition to ongoing supporting activities, conducting the following tasks:

1. *The DCDB/TSCOM industry days*

A series of four virtual workshops were held hosted by the DCDB and Lamont-Doherty Earth Observatory covering topics as Data Stewardship, Data Discovery & Identifying Data Gaps, Data Access & Community Needs and Data Processing, Transformation & Integration. The workshops were well received and are recorded for future reference and website resources.

In May 2023, the workshops were followed by a three days on-site event at Lamont-Doherty Earth Observatory, NY where the results of the workshops were refined and analyzed. The meeting in NY was attended by the vice chair of TSCOM (Federica Fogliani).

2. *Development of an opportunistic mapping tool*

A report was presented by the working group which gives a first idea of what technologies are available today that can underlay the required tool. A meeting was held in NY during the Industry days event to develop the next step of the roadmap. Input has been received through Seabed 2030 about tools and application in use today.

Important element of this task is the link with the work of the TSCOM metadata working group. The aim is to develop a strong link between the highly necessary tool and the DCDB “backoffice”. Ultimately, it should be possible to access the bathymetric resources held at the DCDB using the GEBCO grid as reference.

3. *Study of Discrete Global Grids*

The GEBCO grid first published in 2003 is based on a (regular) linear grid. This has been the standard in (geo) computer science for many years, it has its drawback as our globe is not linear. New technologies are being developed by disruptive industries like Uber for using discrete global grids. Using other gridding methods may solve two problems for GEBCO. The problem of map projections and the problem of multi resolution data delivery. This task will result in a report about the current state of technology and the feasibility for GEBCO to adopt global discrete grids as an additional means of disseminating the GEBCO digital grid.

4. *Maintenance of the GEBCO Cookbook*

The last edition of the GEBCO Cookbook dates back to 2019. Given the speed at which today's technology is progressing, 2019 can be regarded as old. Over the last year many authors have been working on updates of the Cookbook. A new version is available but needs to be endorsed first. As this is a long and tedious process, TSCOM will issue the updates as a on-line resource for those interested. TSCOM will also recommend to GGC 40 to turn the cookbook into a living document instead of a rigid publication.

In addition to above tasks, the Chair of TSCOM has been intensively involved in the drafting work of the new GEBCO strategy and in support of the Seabed 2030 wind in the sails project.

Other scheduled activities before the GGC40 meeting in Monaco are a visit to the Nippon Foundation - GEBCO Seabed 2030 Project's South and West Pacific Regional Mapping Community Meeting, 12-14 July 2023 in Lima, Peru.

Sub-Committee on Regional Undersea Mapping (SCRUM)

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.

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

The primary mission of SCOPE is to lead the strategy, development and execution of a communications and outreach plan in concert with the GGC, Seabed 2030, IHO, IOC and other related projects, programs and organizations affiliated with GEBCO. SCOPE has gone through transformational change since its inception as a formal subcommittee in 2018 and is considered to be in early stages of maturation as a GEBCO subcommittee.

In November, 2021, the SCOPE membership elected Tim Kearns as the new Chair for a 3 year term with Eunmi Chang reverting to Vice-Chair for the remainder of her term. One of the principle activities of SCOPE is to increase engagement of existing and new members.

Activities of SCOPE included soliciting, reviewing and ultimately declining a proposal from ESP Advisors for the development of a Communications Strategic Plan. Similarly, a proposal from Oxygen Consultants to review communication channels, strategies and develop a new communications plan was solicited, reviewed and ultimately declined. The primary reason for delaying an advancement of committing limited GEBCO resources to these efforts was due to the development of the GEBCO Strategic Plan and Governance documents, which GGC determined was a priority activity.

Other work items included the development of the B-10 History of GEBCO chapter, creation of an updated GEBCO world map in poster format (printed and distributed at the IHO General Assembly), planning and delivery of the Map the Gaps Symposia (Virtual hosted by IOC (Paris), January 2021, Virtual hosted by IOC (Africa), December 2021, Southampton, UK, Oct 26-29, 2022). Other activities that continued during this reported period include early stage conceptualizing of a social media strategy for GEBCO, outreach with other projects and programs affiliated with GEBCO (i.e. Seabed 2030, IOC, IHO) and participation in the planning and delivery of a GEBCO booth for exhibition at the IHO General Assembly in Monaco, May 2023. As 2023 marks the 120th anniversary of the GEBCO project, SCOPE is assisting with the coordination and communication of this remarkable milestone.

SCOPE is but one of several subcommittees within GEBCO and is actively participating in the better coordination and communication between subcommittees. This includes shared resources (Google Workspace), communication tools, website design/update planning. SCOPE is also working with Map the Gaps to plan and deliver the Map the Gaps Symposium in conjunction with the IHO CSB WG Industry Day during GEBCO Week 2023, Monaco, November 2023.

Sub-Committee on Education and Training (SCET)

During GGC38, the work that has been undertaken to establish a new GEBCO Sub-Committee on Education and Training (SCET) was presented. The aim of SCET is to develop and coordinate the education and training strategy of the GEBCO Programme. In addition, SCET aims to raise awareness amongst academic institutions of gaps in education and training that may impact on the progress and development of ocean mapping and in particular, the objectives of the GEBCO Programme.

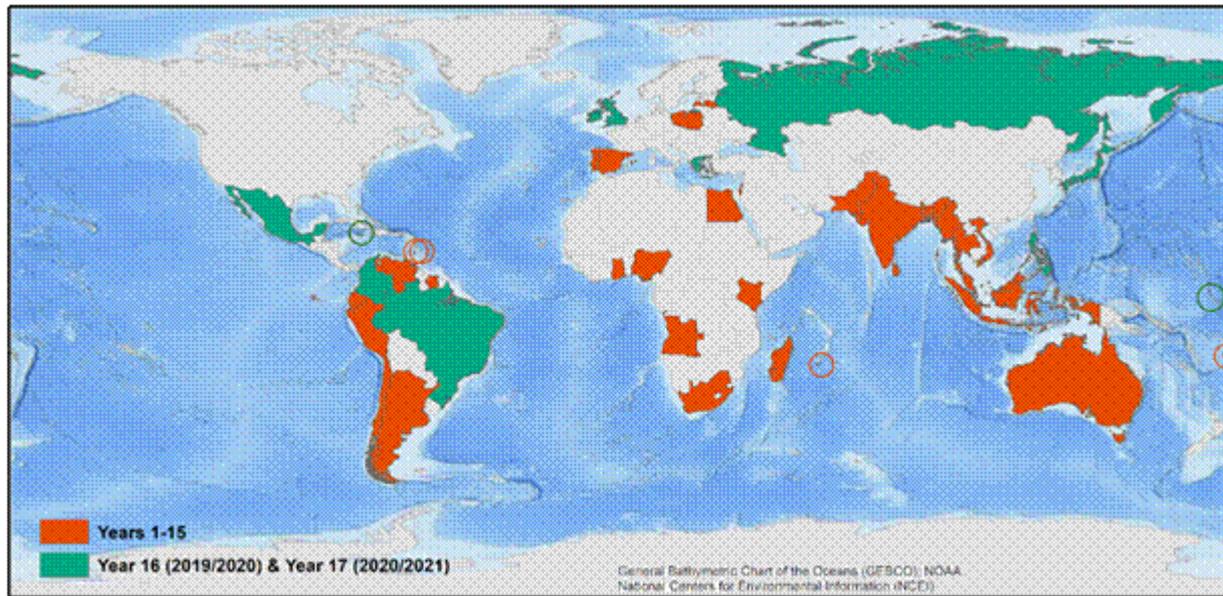
Subsequently the ToRs and RoPs were reviewed and accepted by the GGC. GGC38 agreed to submit these ToRs and RoPs to IRCC14 and to IOC32 for formal endorsement (see Annex B) and acknowledgement of the inaugural Chair and Vice-Chair Elects:

Mr Paul Brett – Chair Elect
Dr Rochelle Wigley – Vice Chair Elect

Initial work has begun on the inaugural year work plan, including the work to expand SCET's membership beyond that of those already involved in the GEBCO community. It will be the recruitment of membership and mobilizing the membership to move forward the important work of the subcommittee, overarching goals of identifying, building, and promoting global capacity in ocean mapping education will serve well the goals of GEBCO. The development of an inventory of the various International and national groups undertaking seabed mapping capability building programs and perform a gap analysis to identify the role that GEBCO and SCET can take in promoting these programs.

GEBCO Training Program (now part of SCET WP)

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 20 (2023/2024) confirmed in March 2023. The Training Program at the Center for Coastal and Ocean Mapping/Joint Hydrographic Center has produced 113 alumni from 46 coastal states to date. These alumni continue to take home their gained knowledge to build skills in their home organizations and beyond.

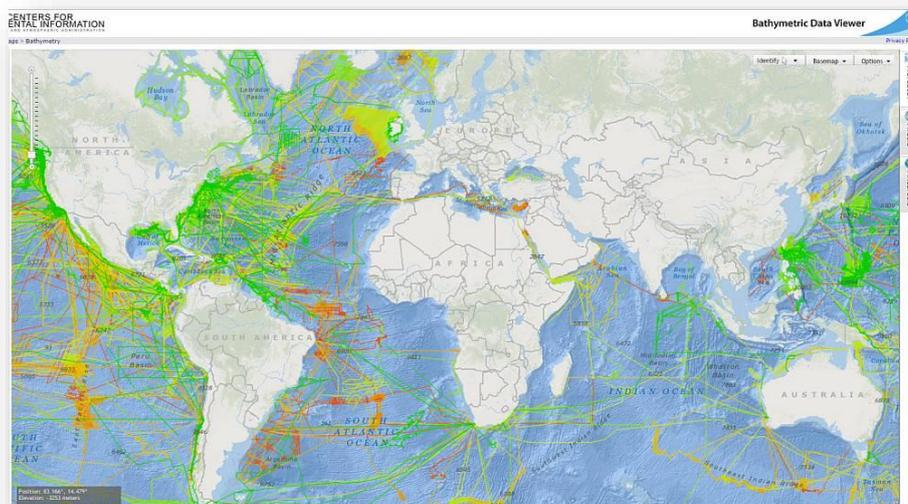


Distribution of Alumni of the Nippon Foundation / GEBCO Training Program (Year 1 to 19)

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.

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 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.

Seabed 2030 Project

The Nippon Foundation-GEBCO Seabed 2030 Project (Seabed 2030) is now in its 6th year of operation. In collaboration with, and with the welcome leadership and support from, The Nippon Foundation, IHO, IOC and the wider GEBCO community, progress continues to be made towards our mission to map the entire ocean floor by the year 2030.

Project Year 5 began in July 2022 whilst the COVID pandemic was prevalent across many countries but was starting to wane in some regions, and our work and engagement has therefore been a mixture of virtual and face to face. In Q1, we saw completion of the final component of the “Two Oceans Two Technologies” (TOTT) Ocean Frontier Mapping work with partners conducting the Saildrone USV transit mission between San Francisco and Hawaii. This demonstrated significant progress in the operation of uncrewed technology for ocean mapping whilst also delivering new data along the route. Innovation elsewhere continued at pace, with further development and testing of a Bathymetry Contribution Form allowing anyone to upload data via a web browser and a standard internet connection. Statistics routines developed on Amazon Web Services have been implemented and now allow better tracking of coverage progress and more efficient capturing of metadata. Collaboration continues with Scripps Institution of Oceanography on SRTM15+ base grid improvements, as well as with the University of New Hampshire (UNH) on improving the capabilities of the BathyGlobe product.

Year 5 delivered the headline of 23.4% of the World Ocean mapped based on the addition to the GEBCO Grid of 10.13 million square kilometres of fresh data – an area equivalent to the size of Europe. This was followed in Year 6 by a further increase to 24.9%; an additional 5.4 million square kilometres of new data – equating to an area twice the size of Argentina. In six years, a total of 90 million square metres of bathymetric data has been acquired by virtue of global partnerships, data mobilisation and strides in technological innovation. Underlying this great achievement has been the huge volume of work undertaken across our Seabed 2030 Centers and respective host institutions, the IHO Data Center for Digital Bathymetry (DCDB) and the GEBCO Community, together with ever-increasing numbers of data contributors and mapping stakeholders.

Data contributions increased from the previous reporting period and, in addition to our regional programmes in support of the IHO Crowdsourced Bathymetry (CSB) initiative, we are seeing increasing interest across a diverse community of owners and operators of superyachts and small vessels who wish to help gather new depth information. To support the harvesting of this bathymetry, we have established a Trusted Node at the Global Center and, with the invaluable assistance of DCDB, UNH and others from IHO's CSB Working Group, have been developing data handling routines. We also now have a CSB Technical Advisor working remotely to provide basic on-call support for logger installation and operation. Support has also been provided towards the development of a new generation of CSB logger via UNH, with the first batch due for roll-out in summer 2023.

IBCAO v4.2 and IBCSO v2.0 were delivered for the Arctic and Southern Oceans respectively in the spring of 2022, with the latter commendably published in the *Scientific Data* journal. There has been synchronisation with South African, Portuguese and French colleagues to access substantial data compilations; and again, with French colleagues, to initiate transit mapping which we anticipate will increase in scope. We have continued to coordinate Satellite Derived Bathymetry in data sparse areas; and are privileged to have been involved in the NIWA-Nippon Foundation "Tonga Eruption Site Mapping Project" (TESMaP), with NIWA's RV Tangaroa operating in the initial phase and SEAKIT's USV Maxlimer operating in the final phase. Here we worked with TESMaP Partners and Nippon Foundation-GEBCO Fellows (Alumni) in mission planning and data acquisition. As part of wider Ocean Frontier Mapping activity, we also supported the Glacier-Ocean Mapping and Research Interdisciplinary Effort (GO-MARIE) in Greenland undertaken by the Ocean Research Project team, bolstered by Alumni mappers, onboard RV Marie Tharp. We have also seen our Center Staff, in their host institution roles, undertake Ocean Frontier mapping as part of wider science programmes in the Arctic, Atlantic, Pacific and Southern Ocean.

New additions to the (non-Center) core team have been made; the Head of Communications, the Head of Partnerships and the Head of Engagement and Development have all provided welcome enhancement in these growing fields of activity. More widely, DCDB has continued to provide excellent support, not only in CSB field activities and in its repository role, but also via infrastructure enhancements, improvements in CSB pipeline and storage, and in multibeam archiving. As a Decadal Flagship Programme, Seabed 2030 continues to work alongside the UN Decade team and other global initiatives. There is also ongoing engagement with the wider GEBCO community, as well as with the external Strategic Advisory Group, which held its first in-person meeting in October 2022. 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 have been extensive discussions on ways of involving individuals within the Project and some have already been greatly involved in Ocean Frontier Mapping activities. The Head of Engagement and Development is delivering a comprehensive strategic plan that utilizes the skills and experience of members of the Alumni to support a wide range of Seabed 2030 activities and is also Chair of the 2023 Alumni Seminar organising committee (July 2023).

Technological innovation and strategy work is ongoing; a professionally drafted strategic white paper was delivered in 2022, which included evaluations of the use of remotely operated and autonomous technology, cloud computing and machine learning. Separately, The Wind in The Sails (WITS) project is progressing, with a comprehensive seabed mapping benefits analysis model having been delivered during Year 5, and work on a global prioritisation tool continuing throughout Year 6.

There has been a significant number of in-person and virtual meetings, workshops and conferences during the reporting period. All have been important and have necessitated participation by individuals across the entire Seabed 2030 team. At a strategic level, these have included: briefing at the 2021 Paris Peace Forum; presenting in the Green Zone at the 2021 UN Climate Change Conference (COP26); and alongside The Nippon Foundation, IHO and IOC, hosting an in-person and live-streamed Side Event at the 2022 UN Ocean Conference. We drew the latter to a successful conclusion with a MOU signing with NOAA underscoring the long-standing support given to us since

our establishment. This has added to the increase in new MOUs over the last two years, with 24 new agreements having been signed during the reporting period, and the total number now standing at 41. Additionally, there are over 200 organisations that have pledged support to the Project in some way, including the sponsorship of licences and actively helping to share messaging. Several new industry and government sector partnerships are being negotiated as we prepare to expand our collaborative network during Year 7 and beyond. Outreach activity and media output has increased since the appointment of the Head of Communications, with articles having been published by high-profile publications including Hydro International, Scientific American and the BBC. Circulation of the periodic newsletter and the phased roll out of a brand refresh late in Year 6 have been key to the implementation of a new Communications Strategy.

Overall, it has been a busy and productive two years for the Seabed 2030 Project, none of which would have been achieved without strong collaboration across the entire Project team and the steadfast support of our parent organisations; The Nippon Foundation, GEBCO, IHO, IOC combined with that of a growing stakeholder community.

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 publicly 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

The latest edition 4.2.0 of Publication B-6 was published in October 2019. Work is currently underway to update this publication with a decision as to whether this will be by way of a Revision or new Edition to be decided.

- B-8 – GEBCO Gazetteer of Undersea Feature Names

SCUFN35.2 reviewed the comprehensive reports prepared by the Secretariat reflecting the work made by correspondence with Members and Proposers, and also to progress with some pending issues regarding B-8 before the meeting. Thanks to the efforts of all parties involved, all pending issues were resolved throughout the meeting, and subsequent decisions made. In application of the procedure by which pending proposals are stored for two years only in the SCUFN archive and the GEBCO Gazetteer database, the Secretariat reported on the names that were deleted before the meeting since related issues were not solved.

- 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. The work is planned to finish before GGC40 in November 2023

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

Christie Reiser (NOAA/DCDB), Chief Editor/Chief of the Editorial Board is leading the update to B-11 alongside seven members from the GEBCO community that make up the GEBCO Cookbook Editorial Board. The ~500-pg Word document has been migrated to InDesign format, making it much easier to handle/update in the future. Seven chapter-sections have been updated and/or consolidated with new material. A DOI has been generated for B-11 and is going through copy edit and Section 508-compliance review. Once complete, it will go to the Editorial Board, TSCOM, the GEBCO Guiding Committee, then the IRCC for final approval before publication.

GEBCO Website

GEBCO's web site (<https://www.gebco.net>) is maintained and updated at BODC. News items, meeting information and ad hoc page update requests from the GEBCO committees have been added to the web sites throughout the year.

A key activity since HSSC13 has been the migration of the GEBCO site to a new management platform (Drupal). The new platform will allow users external to BODC to manage sections of the site and give more options for future development of the site. The majority of the site content has been migrated to the new platform. The finalization of the launch of the new site is expected to take place during the summer 2023.

This migration work was directly funded through an additional budget line provided through TSCOM. The analysis of visits to the GEBCO Website since 2009 shows a general increase in traffic (Figure 1).

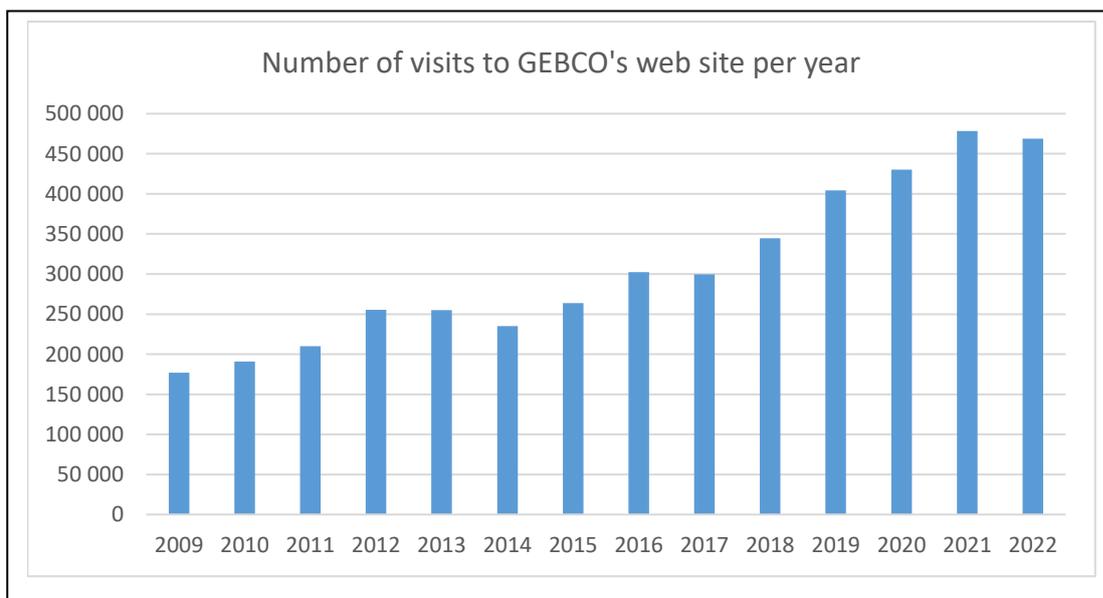


Figure 1. Access to GEBCO's web site since 2009

GEBCO’s gridded bathymetric data sets are made available for direct download via GEBCO’s web site (https://www.gebco.net/data_and_products/gridded_bathymetry_data/) either as global grid files or for user-defined geographic areas. During 2022, there were over 633,000 downloads of GEBCO’s data sets.

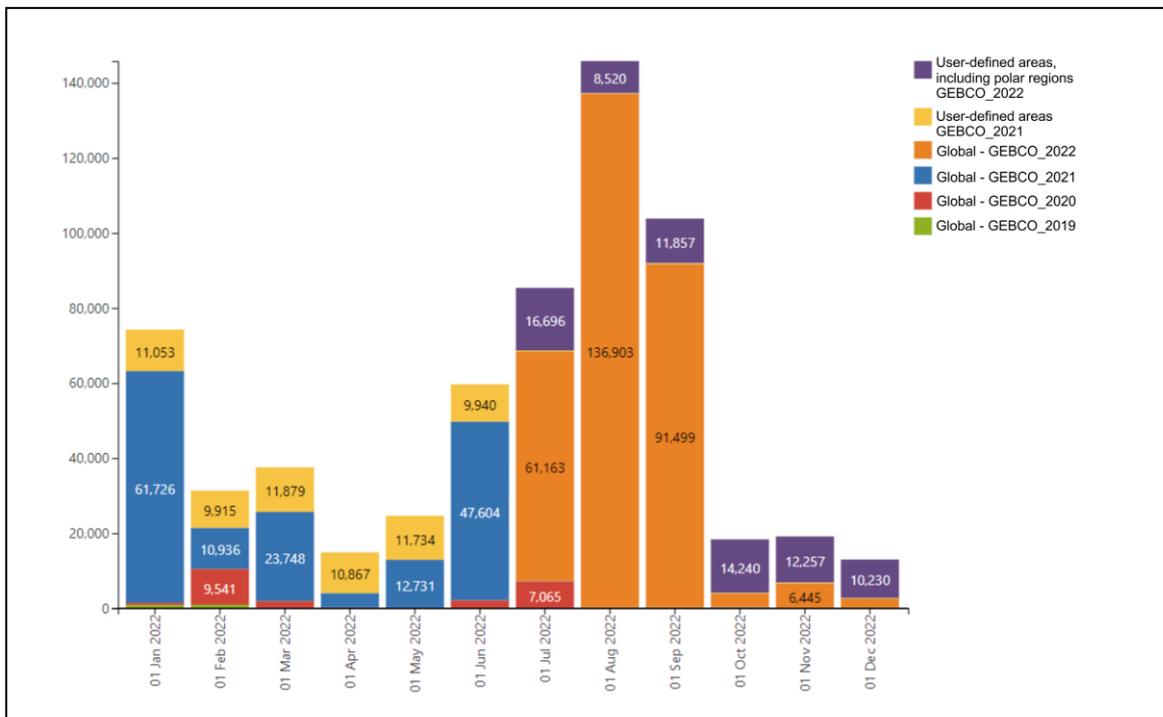


Figure 2. The number of downloads of GEBCO’s gridded data sets in 2022

Figure 2 shows the number of downloads for each of GEBCO’s data sets and if these are downloads of the global grid file or for user-defined sub-sections of the global grids.

During 2022, the GEBCO grid download app (<https://download.gebco.net/>) was updated to allow download of gridded bathymetry data for polar regions in polar projection co-ordinates.

A dedicated Web Map Service (WMS) is created for each release of the GEBCO grid. The WMS can be accessed from GEBCO’s web site (https://www.gebco.net/data_and_products/gebco_web_services/web_map_service/). The WMS includes a number of pre-processed layers:

- Shaded relief imagery coloured for elevation
- Imagery showing ice surface and sub-ice topography
- TID grid colour coded for TID value
- Layer showing areas based on measured data or pre-generated grids

Annex A – GEBCO Code of Conduct

This Code of Conduct was developed to consolidate the ethical expectations of all GEBCO participants (Members) and reinforce the values that should be the foundation of the working environment of this international group of experts.

1. GEBCO is grounded on the principles of cooperation, inclusivity, integrity, transparency, fairness, justice, trust and mutual respect.
2. GEBCO Members are expected to treat everybody fairly and with respect. In particular, harassment, discrimination and bullying are considered intolerable behaviours. GEBCO adheres to the guiding principles, definitions and policies contained in ETH/PI/POL/3 /REV (UNESCO Anti-Harassment Policy 2019).
3. GEBCO Members shall follow the Code of Conduct to prevent harassment, including sexual harassment, at UN system events (un.org/codeofconduct) during meetings, conferences and symposia, receptions and any other organized forum.
4. GEBCO Members that may have experienced harassment should seek advice from the GEBCO Secretary or Guiding Committee Chair or Vice-Chair, who will properly manage the situation according to the circumstances and in a respectful manner for all the involved parties. If this route is deemed inappropriate, then GEBCO Members should seek advice from another member of the Guiding Committee.
5. GEBCO Members should report any wrongdoing that they may be aware of and raise concerns following the same route described above.
6. GEBCO Members are expected to disclose any other role or participation on a board, panel, committee or such in entities that may interfere or be perceived as incompatible or in conflict of interest with GEBCO.
7. GEBCO Members are encouraged to recuse themselves from GGC and other GEBCO subordinate body deliberations and decisions where conflict of interest might arise.
8. GEBCO Members agree to use best efforts to keep confidential all matters that so require and, in particular, treat all personal matters with privacy and confidentiality, in a manner that is consistent with their own organization ethics guidelines where they exist.
9. GEBCO Members are expected to make or issue either public or internal statements only in an objective and truthful manner.

Annex B – General Bathymetric Chart of the Oceans (GEBCO) Sub-Committee on Education and Training (SCET) – Terms of Reference and Rules of Procedure

Preamble

At a virtual meeting of the GEBCO Guiding Committee (GGC) held on 18-20 January 2021, it was agreed that a new Sub-Committee was required to coordinate the GEBCO Project education and training strategy and engagement with the numerous academic institutions offering Ocean Mapping related courses globally and from which the GEBCO Project does and could benefit. These Terms of Reference (ToR) and Rules of Procedure (RoP) were circulated to the full GGC intersessionally between the 37th and 38th meetings of the GGC and the Sub-Committee was approved to commence work under these ToRs and RoPs. The decision to create this new Sub-Committee was communicated to IOC and IHO.

Authority for the creation of this Sub-Committee is included in the GGC Terms of Reference, paragraph 9, which states that “The GEBCO Guiding Committee shall 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.” In accordance with paragraph 9 of the GGC Terms of Reference, SCET shall cooperate with the TSCOM (The Technical Sub-Committee on Ocean Mapping) which aims at serving and advising technical aspects in building and use of GEBCO products, SCRUM (The Sub-Committee on Regional Undersea Mapping) which aims at coordinating regional mapping initiatives, SCUFN (Sub-Committee on Undersea Feature Names) which aims at serving as a designated authority for all matters concerning undersea feature names, SCOPE (Sub-Committee on Communications, Outreach, and Public Engagement) which aims to coordinate the communications, outreach and external relations strategy and activities being conducted to support and raise awareness of the GEBCO Project and to complement the focused outreach activities of the Seabed 2030 Initiative, and Seabed 2030 Project Team to ensure a coordinated approach and engagement is achieved with Ocean Mapping programmes, whose graduates support the activities of the IHO-IOC GEBCO Project and potentially will become the next generation of leaders within the GEBCO Project as well as the wider Ocean Mapping field. SCET also facilitates to raise awareness amongst academic institutions of identified gaps in education and training that impact on the progress and development of Ocean Mapping and the objectives of the GEBCO Project in particular.

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 education and training matters relevant to the goals of GEBCO as set out in the GGC Terms of Reference and Rules of Procedure.
- 1.2 The Sub-Committee shall:
 - 1.2.1 Regularly survey academic institutions providing Ocean Mapping programmes to identify any topics which will impact on the goals of GEBCO and the development of the next generation of Ocean Mappers.
 - 1.2.2 Foster collaboration and engagement with the various academic institutions providing Ocean Mapping programmes.
 - 1.2.3 Identify the gaps in courses, where new technologies and methodologies are not part of the current programme and which would benefit progress towards the goals of the GEBCO Project.
 - 1.2.4 Identify requirements for further education and training, and engage with relevant institutions and organizations (academic and commercial) for opportunities for the provision of suitable courses and workshops.
 - 1.2.5 Establish, support, and/or disband working groups or project teams, as needed, to carry out specific tasks or product development that advance the GEBCO Project.

- 1.2.6 Work closely with other GEBCO Sub-Committees and subordinate bodies of the IHO and IOC on matters of common interest.
- 1.2.7 Be the lead liaison between the GEBCO Project and the UNH Ocean Mapping Programme, providing comment on course content and future development, placement opportunities and acting as the conduit for communication between the GEBCO Project and UNH.
- 1.2.8 Act as the focal point for all Ocean Mapping Programme alumni, encouraging and providing opportunities to become involved in GEBCO Project activities and subordinate bodies.

2. Rules of Procedure

- 2.1 Membership of the Sub-Committee is covered by the following rules:
 - 2.1.1 Members of the Sub-Committee are experts acting exclusively for the benefit of the Joint IHO-IOC GEBCO Project.¹
 - 2.1.2 Sub-committee normally shall include the representatives of Sub-Committees and GEBCO Projects who are appointed by TSCOM, SCUFN, SCRUM, SCOPE and Seabed 2030 Project.
 - 2.1.3 Members should be encouraged to participate according to their individual expertise for the communications, outreach and external relations strategies to raise awareness of the GEBCO Project.
 - 2.1.4 Members are expected to participate actively in the committee's work. This can include, but is not limited to, attendance at in-person or virtual meetings, active and substantive email correspondence, or meaningful contribution to a GEBCO activity. After a non-participation period of a member exceeding 2 years, the member's status is changed to a non-voting inactive member, and the Chair may approach them about withdrawing his/her membership.
- 2.2 The Chair and Vice-Chair shall be elected by active Sub-Committee members. Their nominations are subject to endorsement by the GGC.
- 2.3 The Chair and the Vice-Chair are elected for a three-year period. The Chair and Vice-Chair may be re-elected for additional terms for a maximum of three consecutive terms if desired by the sub-committee members and subject to their availability. The Chair or, in his/her absence, the Vice-Chair shall conduct the business of the Sub-Committee.
- 2.4 Meetings will usually be held every year, ideally before the GGC meeting. In the intervening period the Sub-Committee shall conduct its business via all appropriate media.
- 2.5 Individuals, entities and organizations that can provide a relevant and constructive contribution to the work of the Sub-Committee may be represented at meetings as Expert Contributors with observer status, at the discretion of the Chair or Vice-Chair.
- 2.6 Members are expected to attend all meetings.
- 2.7 Observers from IHO and/or IOC Member States may attend meetings.
- 2.8 The quorum to hold a meeting shall be not less than 50% of the listed active Sub-Committee Members. The Sub-Committee shall strive to make decisions by consensus. If consensus cannot be reached, decisions shall be taken by simple majority vote. Only listed active members present may cast a vote. The Chair shall have the casting vote if there is a tie.
- 2.9 Recommendations and advice of the Sub-Committee shall be provided directly to the appropriate subordinate bodies of GEBCO.

¹ So far as IOC is concerned, the Sub-Committee is classed as a Joint Group of Experts under the IOC Guidelines for subsidiary bodies.

- 2.10 Resolutions of the Sub-Committee shall be submitted to the GGC for consideration and decision.
- 2.11 The Chair shall submit an annual report to the GGC.