

EDITORIAL

Maritime partners

In each issue of our bi-monthly newsletter, **In-depth**, we feature the activities of one or more of our maritime partners who have committed themselves to our ultimate objective – the mapping of the entire ocean floor by the year 2030. In addition to this, for our third edition, we would like to offer an insight into the work of one of our parent organisations: the General Bathymetric Chart of the Oceans (GEBCO).

As many of our readership will know, Seabed 2030 is a collaborative project between The Nippon Foundation and GEBCO. Operating under the auspices of the International Hydrographic Organization (IHO) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, GEBCO aims to provide the most authoritative, publicly-available bathymetric datasets for the world's oceans. Consisting of an international group of experts in ocean mapping, this issue of In-depth will update readers on the role of GEBCO's Guiding Committee and its four Sub-Committees.

In delivering its objective, Seabed 2030 relies on the leadership and support of The Nippon Foundation and GEBCO. Of course, we also depend very much on our international partnerships which are essential to the Project, including the exceptional Five Deeps Expedition – the world's first manned expedition to the deepest point in each of the world's five oceans. Seabed 2030 and the Five Deeps Expedition signed a Memorandum of Understanding (MOU) in March 2019 at IHO's headquarters, in Monaco. The MOU created a number of pathways for the two organizations to collaborate in order to source and share new maritime data for the benefit of science and public use. Five Deeps agreed that high resolution data from its expedition would be donated to Seabed 2030 for inclusion in its global map of the ocean floor. This invaluable contribution could not be obtained

GEBCO Symposium on Bathymetry

11-15 January 2021

[CLICK HERE](#) to register and join the world's experts on ocean floor mapping for a VIRTUAL special one-week event focused exclusively on bathymetry.

[Further details on page 5](#)



from any other source and was therefore uniquely to the benefit of the Seabed 2030 Project.

These solo dives by Victor Vescovo included the Puerto Rico Trench in the Atlantic; the South Sandwich Trench in the Southern Ocean; the Java Trench in the Indian Ocean; the Mariana Trench and Challenger Deep in the Pacific; and the Molloy Deep in the Arctic Ocean – situated 275 km west of Norway's Svalbard archipelago. The expedition also visited the wreck of the Titanic. Every dive was made using the 12-tonne Deep Sea Vehicle (DSV), Limiting Factor. The last dive – to the Molloy Deep – is covered in this edition of the newsletter.

Drawing this editorial to a close, your attention is drawn to an amazing opportunity to work within our Seabed 2030 Team. Working with our recruitment partner, Hays, we are now advertising the role of an Alumni Coordinator. This is an exciting new opportunity and the successful candidate will work to support the engagement and development of The Nippon Foundation-GEBCO Alumni in support of the Seabed 2030 mission. Further information on how to apply is included in this newsletter.

Jamie McMichael-Phillips
Seabed 2030 Project Director



REGIONAL CENTERS

Atlantic and Indian Oceans Regional Center

The Regional Center for the Atlantic and Indian Oceans has continued to be busy with data coordination and assembly as well as stakeholder engagement. Over the past few months, team members have participated in several virtual events to engage with communities throughout the region with the goals of fostering new collaborations and increasing data coverage.

In early November, an invited presentation was given at the Brazilian Marine Geology and Geophysics Program (PGGM Brasil 2020) meeting. The PGGM was formed over 50 years ago and represents a broad multi-sector consortium of stakeholders focused on mapping and characterizing the Brazilian continental margin and nearby areas of the Atlantic and Antarctic. The opportunity to participate in this event was an important first step in strengthening collaboration with colleagues in Brazil to work together toward common goals in the South Atlantic.

Team members also attended the UN Ocean Decade Virtual Series “Co-Designing the Ocean Science we want for Africa” which offered important perspectives on the challenges facing regional communities in Africa while fostering dialogue and partnership between stakeholders. Outcomes of this webinar series include new connections with colleagues interested in advancing mapping initiatives in their regions of Africa. Initial discussions are underway about coordinating regional virtual events in the coming months to foster capacity development with a focus on technical skills related to data management, data processing and interpretation. Information about upcoming virtual events focused on the Atlantic/Indian region will be provided on the center web page.

Center Head: Dr Vicki Ferrini
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Southern Ocean Regional Center

Working with many enthusiastic hydrographers, scientists, and other interested parties has been a privilege for the Southern Ocean Regional Center. There are over 50 institutions and data centers that have contributed bathymetry data, aided in compiling land values including remote island topography, and depicting accurate land-ice interfaces, such as glacial tongues. The team is grateful to all contributions, especially those in recent years since the first release of IBCSO 1.0 in 2013. Institutes have helped in tracking down missing data within the extended 60°S to 50°S region and in sharing new data findings.

Sifting through thousands of datasets as the team continues to process raw data makes us aware of how a single expedition has the ability to significantly change the shape of the sea floor. There is a growing number of institutes approaching us for an up-to-date coverage map prior to each voyage, so that they too can help fill in these gaps. Even standard, frequently visited transit routes, such as within the Drake Passage, could be offset by just a hundred meters in order to cover unmapped areas. These higher resolution areas can now allow us to identify seamounts, guyots, submarine ridges and canyons, for example, and provide much more insight into successfully modeling Antarctic processes.

Recently, crowd-sourcing has made it possible for people to provide feedback and draw our attention to areas that have changed. We are working to ensure the accuracy and quality of the sea floor topography by addressing any concerns from the public and constantly reviewing incoming data sets. Once IBCSO 2.0 is released, it is our focus to make coverage maps much more accessible, to identify possible sources and collaborations, and to continue to hold meetings and workshops for the bathymetry community of the Southern Ocean.

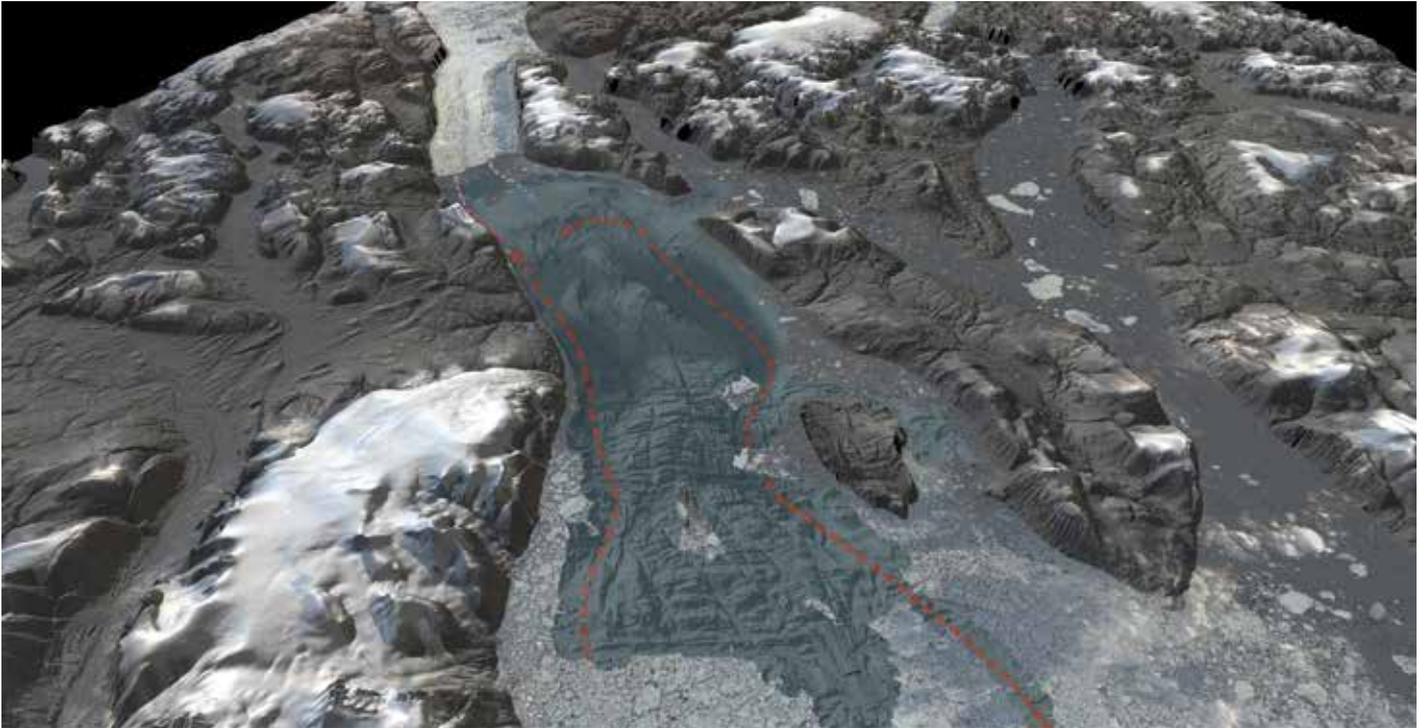
Ms Laura Hehemann, Data Manager and Curator, IBCSO

Center Head: Dr Boris Dorschel
southern-ocean@seabed2030.org

Earlier this year, Professor Larry Mayer (co-Head of the Arctic and North Pacific Ocean Regional Center) was selected as the recipient of the Walter Munk medal – awarded for extraordinary accomplishments and novel insights in the area of physical oceanography, ocean acoustics, or marine geophysics. Professor Mayer will be delivering the Walter Munk Lecture at the Acoustical Society of America meeting, taking place in December, as part of his award.



REGIONAL CENTERS



Arctic and North Pacific Ocean Regional Center

The Arctic and North Pacific Ocean Regional Center continues its regular mapping expeditions, alongside its other activities in support of Seabed 2030. In 2019, the Ryder 2019 Expedition aboard the *Oden* was the first ever to enter and map the Sherard Osborne Fjord in northern Greenland. Bathymetric and oceanographic data collected by scientists aboard *Oden*, from uncharted waters, offer important insights into the processes that are controlling the rapid loss of the Greenland Ice Sheet over the last four decades.

The ground-breaking data, published in the [Nature Journal Communications Earth & Environment](#), reveal melting and calving glaciers act as key catalysts for the increasing loss of ice sheet. But the processes controlling advance and retreat of outlet glaciers remain relatively unknown, limiting the ability to assess their fate and contribution to global sea-level rise. It is thought that the key insights provided by the data may play a valuable role in undertaking assessments of the North Greenland Ice Sheet's future retreat.

Center co-Heads: Professor Martin Jakobsson and Professor Larry Mayer
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3D-visualization showing the seafloor bathymetry of the previously uncharted Sherard Osborn Fjord, north Greenland. The red line illustrates a bathymetric shoal partly shielding Ryder Glacier from inflowing warmer water of Atlantic origin.

Credit: Professor Martin Jakobsson, Co-Head of the Seabed 2030 Arctic and North Pacific Ocean Regional Center

Seabed 2030 Arctic – Antarctic – North Pacific Mapping Meeting

15-16 December 2020

Organised by the Alfred Wegener Institute Bremerhaven, Stockholm University, and the Center for Coastal and Ocean Mapping University of New Hampshire.

The third Seabed 2030 Arctic-Antarctic and North Pacific Mapping Meeting will be held virtually from 15-16 December 2020.

This meeting will continue the series of mapping meetings hosted by the Seabed 2030 Regional Centers, which started in 2018. The aim of the meeting is to: review the progress made since the previous meeting in 2019; identify new bathymetric data sources; develop strategies to locate and unlock data sets for Seabed 2030; and discuss the implications of COVID-19.

A detailed programme, along with registration details, will be uploaded to the Seabed 2030 website soon. In the meantime, interested participants can contact: [Boris Dorschel](#) (Antarctic), [Caroline Bringensparr](#) (Arctic), [Paul Johnson](#) (North Pacific).

REGIONAL CENTERS



R/V Falkor holding position on the outside of Ribbon Reef #5 as ROV SuBastian works its way up the shelf, working to reveal – for the first time – evidence into the origins of the Great Barrier Reef.

Credit: Dean Miller/Schmidt Ocean Institute

South and West Pacific Ocean Regional Center

There have been a few big items of news from the South and West Pacific Ocean Regional Center. In Australia, scientists have discovered a massive detached coral reef in the Great Barrier Reef, the first to be discovered in over 120 years.

The reef was first found while scientists were conducting underwater mapping in the area. The team then sent an underwater robot to investigate, which sent back high-resolution footage that was live-streamed on the [Schmidt Ocean Institute's website](#) and [YouTube channel](#).

The 3D map of the reef reveals a base that is 1.5km-wide, then rises 500m to its shallowest depth of only 40m below the sea surface. This impressive underwater feature adds to the seven other tall detached reefs in the area, mapped since the late 1800s, including the reef at **Raine Island** – the world's most important green sea turtle nesting area.

“This unexpected discovery affirms that we continue to find unknown structures and new species in our Ocean,” said Wendy Schmidt, co-founder of Schmidt Ocean Institute. “The state of our knowledge about what’s in the Ocean has long been so limited. Thanks to new technologies that work as our eyes, ears and hands in the deep ocean, we have the capacity to explore like never before.”

This important discovery contributes to The Nippon Foundation-GEBCO Seabed 2030 Project.

Other recent seafloor mapping progress include two maps released by GNS Science that give insights into the forces that shaped Aotearoa/New Zealand and the mostly submerged continent that lies beneath New Zealand's feet.

For more information about the new maps of New Zealand's seafloor, visit the [E Tūhura – Explore Zealandia \(TEZ\) website](#).



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Scientists discover 500 meter-tall coral reef – the first to be discovered in over 120 years

Measuring more than 500m high – taller than the Empire State Building and the Sydney Tower – the reef was discovered by Australian scientists aboard Schmidt Ocean Institute's research vessel Falkor, currently on a year-long expedition of the ocean surrounding Australia.



The Last Dive – the Molloy Deep

On 24 August 2019, Victor Vescovo became the first human to dive to the bottom of the deepest point of all five of the world’s oceans. His final dive was to the Molloy Deep with external sea temperatures dropping to -2 °C, Victor dived to a depth of 5,550 +/- 14 metres – the deepest point in the Arctic Ocean. This dive took place 40-50 miles from an ice pack edge, leading to a dangerous dive.

Victor Vescovo and the Five Deeps team completed the final mission of the expedition in the world’s deepest diving operational submersible – the Limiting Factor.

The Molloy Deep was formed as the Eurasian and North American tectonic plates split apart and lies 275 km west of Svalbard, Norway.

Looking to the future – Victor is considering that a possible challenge might be the volcanic Mauna Kea in Hawaii, the tallest mountain in the world. It stands at 33,500 feet, significantly higher than Everest, but half of it is underwater. No one has ever started at the base of the mountain, underwater, and then gone on to the summit. Quite a challenge.



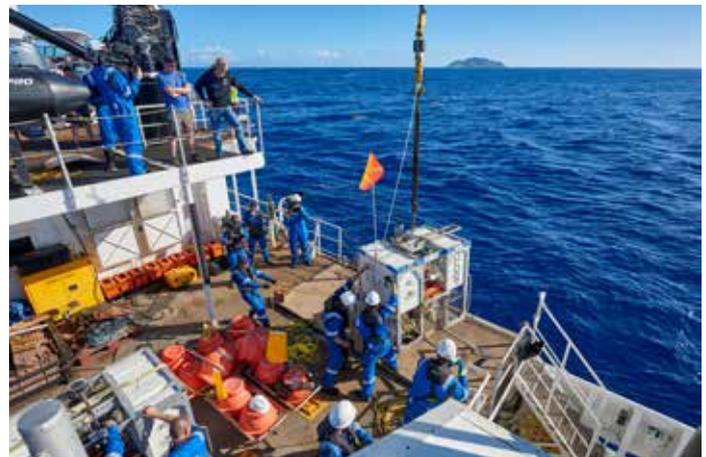
Victor Vescovo returning to the surface after his final dive to the Molloy Deep

Credit: Five Deeps Expedition



Victor Vescovo

“Since we began the Five Deeps expedition in 2018, we have mapped over 1 million square kilometers of seafloor with resolution of at least 30-50 meters. We are happily donating all of that information to Seabed 2030.”



The Five Deeps team preparing for the first dive to the Puerto Rico Trench

Credit: Reeve-Jolliffe

[Click here for more information on the Five Deeps Expedition](#)



GEBCO Symposium on Bathymetry

11-15 January 2021

The GEBCO Symposium on Bathymetry is an annual event bringing together the world’s leading experts on ocean floor mapping. It is attended by governments, researchers, explorers, students, industry and emerging technologists.

Join the world’s experts on ocean floor mapping for a VIRTUAL special one-week event focused exclusively on bathymetry.

The GEBCO Symposium 2021 Sessions:

- Autonomous mapping technology
- Cloud data transformation
- The Nippon Foundation/GEBCO Scholars
- UN Decade of Ocean Science
- Regional mapping initiatives and more...

**REGISTRATION
NOW OPEN**



GEBCO

The IHO-GEBCO Guiding Committee

In 2016, The Nippon Foundation and GEBCO held the Forum for Future Ocean Floor Mapping in Monaco to evaluate the importance, and the role, of bathymetric mapping for the future of the world, and to develop a roadmap for the future of ocean floor mapping. Based on the outcome of the Forum, The Nippon Foundation and GEBCO established the Seabed 2030 Project.

The work of the GEBCO Project is overseen and guided by the IHO-IOC GEBCO Guiding Committee, and largely relies on the efforts of an international collaborating community of scientists and hydrographers. GEBCO is committed to developing and constantly improving the portrayal of global ocean depths. In doing so, GEBCO seeks to advance the development and application of seafloor mapping technology, as well as fostering collaboration among individuals and organizations with established and developing expertise so as to assist local and regional mapping efforts to attain a global standard of quality.

The Guiding Committee, established in 1973 as a subordinate body of the IHO and IOC, is also responsible for overseeing the activities of Seabed 2030 – a task it achieves with the

support of its four Sub-Committees: Sub-Committee on Undersea Feature Names (SCUFN); Technical Sub-Committee on Ocean Mapping (TSCOM); Sub-Committee on Regional Undersea Mapping (SCRUM); and Sub-Committee on Communications, Outreach and Public Engagement (SCOPE).

Some of the key oversight responsibilities of the Guiding Committee include, coordinating the preparation and dissemination of maps, grids, data files and other appropriate depictions of the ocean floor. The Guiding Committee also tasks the Sub-Committees, to increase the coverage, and therefore completeness, of the GEBCO grid.

Vice Admiral (ret) Shin Tani
IHO-IOC GEBCO Guiding Committee, Chair

For more information on GEBCO's committees and working groups, including its members, [click here](#).



The Nippon Foundation-GEBCO Alumni at the Forum for Future Ocean Floor Mapping

Credit: Rebecca Marshall

GEBCO

Sub-Committee on Undersea Feature Names

In 1974, the GEBCO Guiding Committee established the Sub-Committee on Geographic Names (SCGN) with a purpose of giving unified geomorphological names to the nautical charts published by GEBCO.

The Sub-Committee's first meeting was held in 1975, at Bedford Institute of Oceanography, and it was agreed that only morphological characteristics should be considered for the naming of undersea features. In 1978, the Advisory Committee on Undersea Features (ACUF) in the US, together with IHO, combined all undersea features to create a total of 44 classifications, published in the Standardization of Undersea Feature Names. Since then, the role of SCGN has expanded to cover data across the globe and, in 1993, the committee's name was changed to the Sub-Committee on Undersea Feature Names (SCUFN).

SCUFN consists of 12 members – six appointed by IHO, and six by IOC. One of the IOC appointed members is also Head of the South and West Pacific Ocean Regional Center, which strengthens the coordination and collaboration between the two organisations. SCUFN reviews, on average, 150 naming proposals per year submitted from country's respective naming authorities.

With Seabed 2030 acting as a major catalyst for the mapping of the world's oceans, SCUFN is prepared for an influx of unnamed undersea features which will need to be reviewed. Attributing appropriate terminology will also support the work of scientists and hydrographers. As of 2019, all nominators of undersea feature names are strongly encouraged to share the associated bathymetric data with Seabed 2030's Regional Centers and the IHO Data Centre for Digital Bathymetry, as doing so will ensure more consistency in future maps, charts and bathymetric material, and will allow the data to be used for other scientific and research activities.

Dr Hyun-Chul Han
SCUFN, Chair

Mr Yves Guillam
IHO, Secretariat

Technical Sub-Committee on Ocean Mapping

The Technical Sub-Committee on Ocean Mapping (TSCOM) was established in 2006 to advise the GEBCO Guiding Committee and all associated groups interested in the building and use of GEBCO products. TSCOM gathers technical expertise from its members covering a wide spectrum of specialities in the field of seafloor mapping, data science, data management, geosciences, computer sciences, and remote sensing among others. It acts as a forum for discussion on emerging technologies and their application on bathymetric and hydrographic data.

Together with the other advising sub-committees, TSCOM co-operates with the Seabed 2030 project team in efficiently leveraging the existing and forthcoming acquisition and processing methods and tools for the benefit of the project. Members of TSCOM participate in monthly Seabed 2030 technical meetings to provide direct input to the project's technical discussions.

Recent examples of outcomes in which TSCOM took a decisive role include: the Type Identifier (TID) associated with the GEBCO bathymetric product, which indicates the type of data supporting the bathymetric estimation; and the [IHO-IOC GEBCO Cook Book](#), which provides detailed descriptions of bathymetric data gathering, processing and management along with methodological aspects related to the interpolation and uncertainty estimation.

Cloud technologies, bathymetry derived from satellite measures (altimetry and imagery); artificial intelligence, semantic and metadata, automation of GIS processes amongst others are all fields of interest in which TSCOM actively seeks new members in order to broaden its advising capacities. Interested collaborators are welcome to join and can contact the committee [Chair](#) or [Vice-Chair](#).

Dr Thierry Schmitt
TSCOM, Chair

World Ocean Council Sustainable Ocean Summit (SOS)

Virtual Edition

The SOS 2020 took place from 8-11 December. Live streams of the various workshops and sessions, which explore a range of cross-sectoral topics, strategies and solutions, can be viewed [here](#).



GEBCO

Sub-Committee on Regional Undersea Mapping

Recognizing the importance of the contributions of regional experts in improving its global bathymetric models, GEBCO established the Sub-Committee on Regional Undersea Mapping (SCRUM) in 2009. SCRUM aims to facilitate a closer collaboration between GEBCO and various regional mapping efforts around the world, including those associated with the regional bodies of the IOC, IHO Regional Hydrographic Commissions, and other regional mapping activities led by governments, industry and academia.

The committee maintains liaisons and cooperates with all existing regional mapping efforts relevant to GEBCO products, contributes to the review and validation of regional products prior to their incorporation into the GEBCO global grid, works closely with the Seabed 2030 Regional Centers, and fosters coordination between relevant regional bathymetric mapping projects and the IHO Data Centre for Digital Bathymetry (IHO DCDB) to capture, for long-term archive, the bathymetric data used by these projects. By coordinating with regional mapping projects on the specifications and preparation of regional digital bathymetric models and charts, the compatibility of the data can be ensured, allowing for a seamless inclusion in GEBCO products. SCRUM encourages the establishment of new IHO/IOC regional bathymetric mapping projects to fill current gaps in global bathymetry, and establishes and coordinates working groups and project teams, as needed, to carry out specific tasks or product developments that advance the GEBCO Project. The SCRUM committee members work closely with other GEBCO Sub-Committees and subordinate bodies of the IHO and IOC on matters of common interest.

SCRUM is currently operated under the leadership of Chair Dr Vicki Ferrini (USA) and Vice-Chair Aileen Bohan (Ireland). The committee is composed of representatives from 18 different coastal states, spread across six continents, representing a combination of government, academia and industry backgrounds.

Dr Vicki Ferrini
SCRUM, Chair

Ms Aileen Bohan
SCRUM, Vice-Chair

Sub-Committee on Communications, Outreach and Public Engagement

At a meeting of the GEBCO Guiding Committee in 2017, members identified the vital importance of communications and outreach. They therefore agreed on the need for a formal sub-committee to promote external activities that would raise awareness of GEBCO's work, and support the outreach activities of Seabed 2030. This is why the Sub-Committee on Communications, Outreach and Public Engagement (SCOPE) – the most recently formed sub-committee – came to be established in 2018.

Essentially, SCOPE is tasked with developing communications strategies – as well as reviewing and enhancing existing material – in support of GEBCO's work. In doing so, SCOPE is able to identify opportunities for engagement between GEBCO's diverse community of stakeholders. SCOPE is also tasked with developing relevant educational material for all levels of school years to help raise the awareness of GEBCO and ocean mapping amongst teachers and their pupils.

The sub-committee is also responsible for recognising any potential complications that members of the public may encounter when using GEBCO products, and providing appropriate support in response to this – this is a key part of SCOPE's mission to introduce a wider audience to the depths of the sea, and to bathymetry.

Professor Hyo Hyun Sung
SCOPE, Chair

VACANCY

Alumni Coordinator

GEBCO and The Nippon Foundation are seeking an Alumni Coordinator to work with the Seabed 2030 Project Director and the Project's Global and Regional Centers. The successful candidate will assist in the engagement, and development of, The Nippon Foundation-GEBCO Alumni ("the Alumni") in support of the Seabed 2030 mission.

For further information and application instructions please contact Andrew Timlin at andrew.timlin@hays.com

Deadline for applications is 14 December 2020

For further information please contact Pegah Souri at pegah@raitorr.co.uk