

EDITORIAL

Increasing the momentum

The UN Decade of Ocean Science for Sustainable Development has been off to an eventful start for Seabed 2030. In addition to being one of the first Actions officially endorsed as part of the Decade, Seabed 2030 has also signed a Memorandum of Arrangement with a Government – the first of its kind to date. Following the MOA, New Zealand’s Government officially joins us as a partner, but as a host of one of our Regional Centers, New Zealand has already provided steadfast support to Seabed 2030 from the outset. This adds to the significant support that we already receive from a number of Member States of both IHO and IOC, and we look forward to encouraging further partnerships across the world to drive forward our mission.

Seabed 2030 has also been selected as one of 80 projects to be showcased at this year’s Paris Peace Forum. Since its creation, the Forum has supported and accompanied more than 300 projects that respond to the cross-border challenges of our time.

I’d also like to congratulate the International Hydrographic Organization (IHO) on its 100th anniversary, which was celebrated on World Hydrography Day on 21 June. It was IHO which, with the Intergovernmental Oceanographic Commission of UNESCO (IOC), helped to inspire and develop the General Bathymetric Chart of the Oceans (GEBCO). GEBCO was formed in 1903 in Monaco as an initiative led by Prince Albert I to produce “a high-resolution digital map from the coast to the deepest trench of the ocean that enables scientists to explore and understand how the works” - this will also inform policy, and supply the management of natural maritime resources for a sustainable blue economy.

This ambition remains – but with the target of the year 2030 for its completion, now driven by The Nippon Foundation-GEBCO Seabed 2030 Project.

On World Hydrography Day this year, Seabed 2030 announced the latest high-resolution GEBCO Grid figure, with 20.6 per cent of the world’s entire seabed now mapped. When Seabed 2030 was launched in 2017, only six per cent of the world’s oceans had been mapped to modern standards. The latest figure has seen a growth of 1.6 per cent from last year’s – an increase equating to half the size of USA. However, with 80 per cent still unmapped, the ultimate target remains an ambitious one – but one that can certainly be achieved through international collaboration.

As I said in an interview with the BBC, a big jump in coverage would be achievable if all governments, companies and research institutions released their embargoed data. Moreover, there is no estimate of how much bathymetric data is hidden away on private web servers, but the volume may be considerable. Those organisations holding such information are being urged to think of the global good and hand over, at the very least, lower resolution versions of their proprietary maps.

By way of encouragement, new MOUs have been announced since the publication of our previous edition.

We are moving in the right direction, but we need to increase our momentum.



Jamie McMichael-Phillips
Seabed 2030 Project Director

Seabed 2030 enters new agreement with New Zealand Government

Seabed 2030 is delighted to announce its latest partnership with Toitū Te Whenua Land Information New Zealand (LINZ) – the first ever agreement between the Project and a government.

On 21 July, Chief Executive of Toitū Te Whenua LINZ Gaye Searancke and Seabed 2030 Project Director Jamie McMichael-Phillips signed a Memorandum of Arrangement which will see the two parties working to advance our understanding of ocean bathymetry and complementing the UN Decade of Ocean Science in Support of Sustainable Development.

Although New Zealand is the first Government to sign up to this significant global mapping project, as a host of one of Seabed 2030's Regional Centers, New Zealand has already provided dedicated support to the Project from the start. Toitū Te Whenua LINZ, NIWA and GNS Science work collaboratively to jointly govern the South and West Pacific Ocean Regional Data Assembly and Coordination Center.

In a speech delivered to the South and West Pacific Ocean Regional Mapping Community after the signing, New Zealand's Minister for Land Information, Hon Damien O'Connor, welcomed the agreement, acknowledging Seabed 2030's official endorsement as one of the first Actions of the UN Ocean Decade. The following is an excerpt from his speech: "We are the first Government to sign up to this significant global mapping project and we have done this on behalf of the South and West Pacific Ocean Regional Centre. [...] As a Government we recently approved a vision for the portfolio of ensuring the long-term health and resilience of ocean and coastal ecosystems, including the role of fisheries [...]"

GNS Science Crustal Geophysics Team Leader Vaughan Stagpoole referred to the MOA as a "major milestone [which] will lead to better outcomes for Aotearoa New Zealand and the Asia-Pacific region, greater understanding of hazards, important new ocean discoveries and a more sustainable and resilient future."



The virtual signing between Seabed 2030 and LINZ – (from left) Ian Simpson, Chief Executive GNS Science, Gaye Searancke, Chief Executive Toitū Te Whenua Land Information New Zealand, Dr Rob Murdoch General Manager Science/ Deputy Chief Executive National Institute of Water and Atmospheric Research, and Jamie McMichael-Phillips, Project Director Seabed 2030 Project

IHO Centenary

Q&A with Dr Mathias Jonas, Secretary-General of the International Hydrographic Organization (IHO)

Dr Jonas was elected Secretary General of the IHO in April 2017. Prior to his election, he was the Vice President of the German Federal Maritime and Hydrographic Agency, and National Hydrographer of Germany where he was responsible for sea survey and sea cartography.

In 1999, Dr Jonas completed the world's first ECDIS type approval. He continues to contribute to International Maritime Organization (IMO) and IHO navigation activities.

Dr Jonas is a Master Mariner, and holds a PhD in Nautical Engineering.



Q. When did you first become interested in maritime matters?

I was born in a harbour city and grew up close to the sea. There have been generations of fishermen in my family, and I was surrounded by mariners and workers on the biggest shipyard of the country. My greatest motivation was to see the world outside, which was nearly impossible for a teenager in the seventies living in East Germany. It was a romantic concept which then turned into real interest for shipping and the ocean itself. I went to sea at 16, got the navigator's license later and then worked on merchant ships for some time.

Q. Before becoming Secretary General of the IHO, you worked at the German Federal Maritime and Hydrographic Agency. Can you tell us a bit about what your work there involved?

Love took me back ashore and I gained skills in computer engineering and nautical sciences at the University of my hometown of Rostock – a rare mixture of capacities. Thanks to this I managed to join the Agency based in Hamburg and was tasked to develop technical test routines for a completely new device: ECDIS. This all started in the mid-nineties and resulted in the first ever formal type approval for an ECDIS device based on IHO technical standards which I authorized officially in 1999. With this achievement I was promoted to greater responsibilities within the hydrographic department and ended up as National Hydrographer and Vice-President of the Agency.

Q. What is the nature of your work contributing to IMO?

Right from the start of my engagement with ECDIS I contributed to IMO's related activities as part of the German delegation. I was convinced that ECDIS would make navigation safer and more efficient and argued tirelessly in favour of it. I have a vivid recollection of the IMO NAV Conference in 2008 where IMO Member States voted in favour of the introduction of an ECDIS carriage requirement. Everybody who deals with IMO knows how rare it is that the chair asks for a vote to end a debate. At that moment I had the feeling of earning

the fruits of years of labour, however, I had no idea that I would one day represent IHO issues at IMO in a completely different role: as Secretary-General. The strong support of IMO's goals is one of my highest priorities in my current responsibility. The IHO has much to contribute toward the digitalization of shipping. The IMO e-navigation concept is based on IHO's S-100 Universal Hydrographic Model and in order to enable safe and reliable autonomous shipping hydrographic input is indispensable.

Q. What is the significance of the centenary, and what do you think are the IHO's greatest achievements to date?

The foundation of such a body like the International Hydrographic Bureau in 1921, only three years after the terrible war, was a sort of a miracle. Half of the world were enemies, economies were down and many lost faith in a better future. But some did take action, arguing that if nations were not necessarily friends, they should at least collaborate for the sake of those who are at sea. They started with a small club of nineteen members but survival was not guaranteed. Money was always short and World War II nearly ruined everything. The President went into exile in New York, and there was only one brave French Secretary remaining who kept the Bureau running over wartime (with a quarter of his salary), one of the American employees became prisoner of war and died in a camp near Menton.

After the establishment of the IMO and IALA, the Bureau – later the International Hydrographic Organization - had to re-invent itself and on more than one occasion some argued the International Hydrographic Organization should be absorbed by a United Nations body. Thanks to charismatic leaders, competent staff at the Secretariat, the ongoing support of Member States in terms of materials and resources and our generous host, the Principality of Monaco, we managed the transition to the digital age. All transportation at sea is based on our standards for navigation, education and training of hydrographers is

Continues overleaf

**Q&A with Dr Mathias Jonas,
Secretary-General of the International Hydrographic Organization (IHO)**

harmonized on global scale. We maintain a network of fifteen regional hydrographic commissions spanning over all sea basins and are partnered with the relevant international organizations in the maritime domain.

processing is less visible but indispensable to create usable datasets and we will keep on working with our Member States to maintain the required expertise and infrastructure.

Q. How did the relationship with GEBCO develop and how does it work?

The GEBCO programme can be with good reasons regarded as the origin of our organization. It was the positive experience of this global ocean mapping programme under the patronage of Prince Albert I of Monaco which gave the inspiration to formalize the idea of international collaboration to promote hydrography on a global scale. The GEBCO concept has survived since 1899. I see three steps of elevation: first, the shared parenthood with UNESCO’s IOC since 1973 and second the shift to digital in the nineties. Thanks to the support of US NOAA, the IHO maintains the one and only authoritative global collection of seabed topographic data. Whenever you see ocean maps on your computer screen they are generated by us. Third, the Seabed 2030 Project as a joint undertaking with the Nippon Foundation gave a big boost to the GEBCO programme. It helped to increase the coverage at a pace never-seen before, with detailed data increasing from 6% to now 21% in only four years!

Q. Looking to the future, what do you hope IHO will achieve in the next 100 years?

The oceans remain the greatest resource for humanity, in all respects. To manage them responsibly can only be achieved through a collaborative approach which puts differences aside and focuses on the technical aspects. The IHO as a technical organization delivers the ideal platform for it. It is a highly respected member of the international maritime community that is looking forward to continuing to contribute the expertise, capacity and energy of its Member States to the evolving ocean narrative.

It has always done this by keeping one question in mind: What can we do together that we cannot do separately, since no single nation can deliver on its own the hydrographic capacity we need for the oceans we want.

It is exactly this spirit generated by the founders – now 100 years ago - which was, is and will be the lead line for the work of the International Hydrographic Organization.

Q. As we enter the final decade of Seabed 2030, in what way will IHO continue to support the Project’s ultimate objective of a complete map of the seabed in less than 10 years?

First of all, we need more and better data. IHO can help to motivate stakeholders to release existing data by keeping the topic on the political agenda. Lobbying is essential, but so is technical standardization and education. I have great hope in technological developments for new sensor technology, autonomous sensor carriers and smart algorithms to process big data. All three elements will help to make measurements less costly and more efficient. Each contribution helps – including our campaign for citizen science named Crowd-sourced bathymetry. Data



Special postage stamp to mark the centenary of the International Hydrographic Organization



Mapping quest edges past 20% of global ocean floor

Following the release of the latest GEBCO Grid – 20.6 per cent of the world’s entire seabed is now mapped. When Seabed 2030 was launched in 2017, only six per cent of the oceans had been mapped to modern standards. The latest figure has seen a growth of 1.6 per cent from last year’s data – an increase equating to around half the size of USA.



UN OCEAN DECADE ACTION

Seabed 2030 officially endorsed as a UN Ocean Decade Action

As part of the global celebrations for World Oceans Day 2021, UNESCO's Intergovernmental Oceanographic Commission announced Seabed 2030 as one of the first Actions officially endorsed as part of the UN Ocean Decade.

Proclaimed in 2017 by the United Nations General Assembly, the UN Decade of Ocean Science for Sustainable Development (2021-2030) seeks to stimulate ocean science and knowledge generation to reverse the decline of the state of the ocean system and catalyse new opportunities for sustainable development of this massive marine ecosystem. The vision of the Ocean Decade is 'the science we need for the ocean we want'. The Ocean Decade provides a convening framework for scientists and stakeholders from diverse sectors to develop the scientific knowledge and the partnerships needed to accelerate and harness advances in ocean science to achieve a better understanding of the ocean system, and deliver science-based solutions to achieve the 2030 Agenda.



Coral Reef in Komodo
 Credit: Beth Watson / Ocean Image Bank

Seabed 2030 selected as one of 80 projects to be showcased at the Paris Peace Forum

The Paris Peace Forum continues to demonstrate that in a deteriorated international environment it is still possible to advance governance solutions, scale up projects and launch new initiatives to tackle the challenges of our time.

Seabed 2030 is honoured to be selected as a project, and we look forward to participating in the Forum in November 2021.



PARIS
 PEACE
 FORUM

NEW APPOINTMENTS

Seabed 2030 appoints Head of Engagement and Development

Shereen Sharma joined the Seabed 2030 Team in June 2021, as its Head of Engagement and Development.

One of the alumni from the first Nippon Foundation-GEBCO Training Programme, Shereen is a hydrographic surveyor and spatial specialist who has a wealth of field, management and commercial experience. Previously she has worked for Chevron and Fugro in a variety of roles in hydrographic surveying data management and coordination across a range of major offshore projects.

She has been an active participant within some of the GEBCO sub-committees and working groups; and since 2018 she has been Fugro's Client Deliverables Manager based in Perth WA. Shereen now runs her own geospatial company and will provide services as the Seabed 2030 Head of Engagement and Development. Shereen's role will include formulating and delivering an effective and comprehensive Alumni Engagement & Development Plan (AEDP) in themes that directly support the Project; and also supporting Ocean Frontier Mapping activities.



Shereen Sharma, Seabed 2030's Head of Engagement and Development

Seabed 2030 Project's newly formed Strategic Advisory Group elects Chair

Members of Seabed 2030's newly launched Strategic Advisory Group have elected Kilaparti Ramakrishna as its Chair. The Strategic Advisory Group is responsible for providing independent strategic and technical advice from the wider mapping community outside the General Bathymetric Chart of the Oceans (GEBCO) to the Seabed 2030 Project.

An International Lawyer, Dr Kilaparti Ramakrishna's experience includes senior positions at the Green Climate Fund and the United Nations Office for East and North-east Asia. For five years, Dr Ramakrishna worked with the United Nations Environment Programme in various roles including as the Principal Policy Advisor to the Executive Director and as Senior Advisor of Environmental Law and Conventions. He has also been involved with drafting the Framework Convention on Climate Change and the Intergovernmental Negotiating Committee of the Convention on Biological Diversity. Prior to joining the UN, Dr Ramakrishna worked for many years at the Woods Hole Research Center and the Woods Hole Oceanographic Institution. Academically, Dr Ramakrishna has taught at several institutions, including Harvard Law School and the Fletcher School of Law and Diplomacy.

The Strategic Advisory Group – which may obtain additional advice through co-opting additional members for specific subject areas – comprises the following four members: Denis Hains of H2i, Bjorn Jalving of Kongsberg Maritime, Dawn Wright of Esri, and Yulia Zarayskaya of the Russian Academy of Science.



Kilaparti Ramakrishna, Chair, The Strategic Advisory Group

SEABED 2030 CENTERS

Seabed 2030 consists of four Regional Centers and a Global Center.

The Regional Centers are responsible for championing mapping activities, assembling and compiling bathymetric information and collaborating with existing mapping initiatives within their regions. The Global Center is responsible for producing and delivering global GEBCO products.

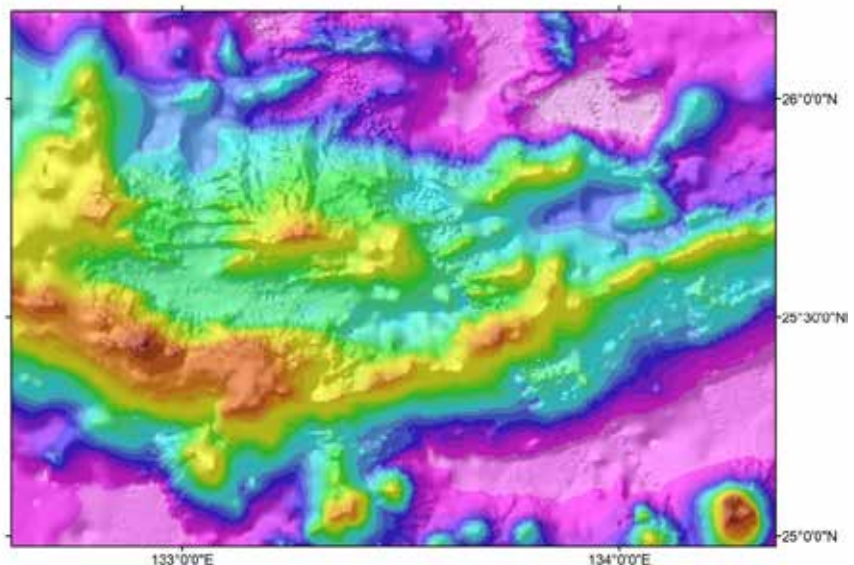
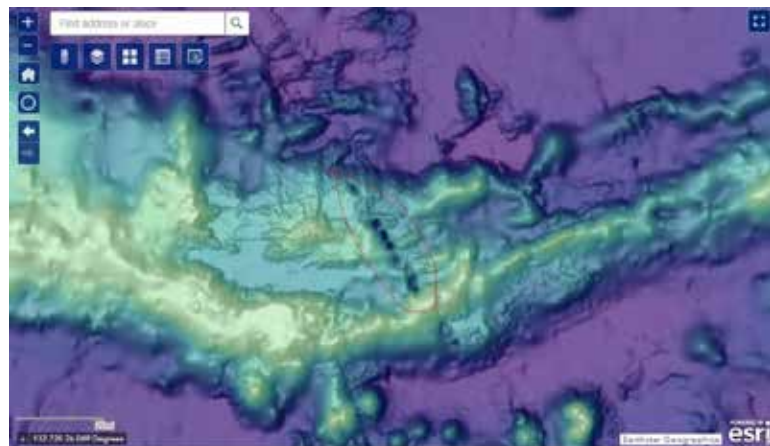
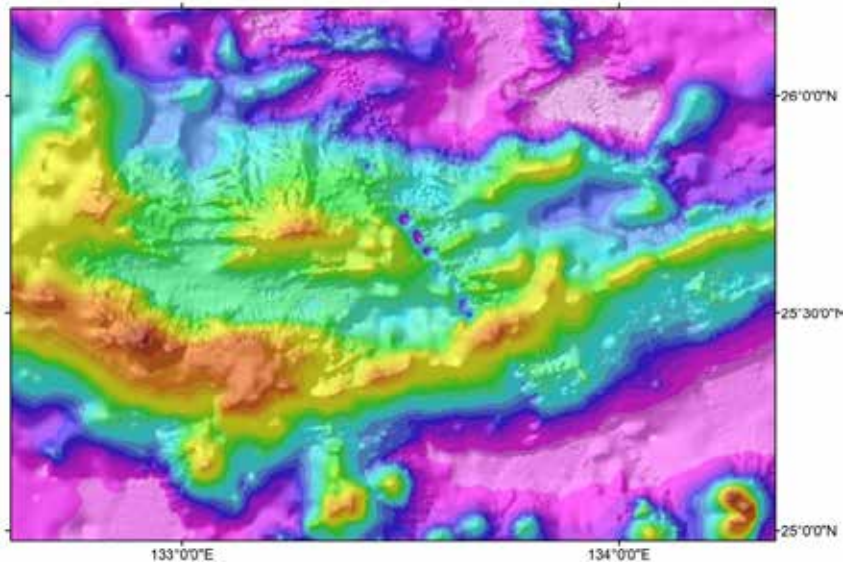
Global Center

Updating the global grid

The main responsibility of the global center is compiling and distributing the global gridded products produced by the Seabed 2030 project, through the GEBCO website. As the project produces a new global grid every year, this is a continuing activity involving constant liaison with the Regional Centers who are working to generate the cleanest observational data they can.

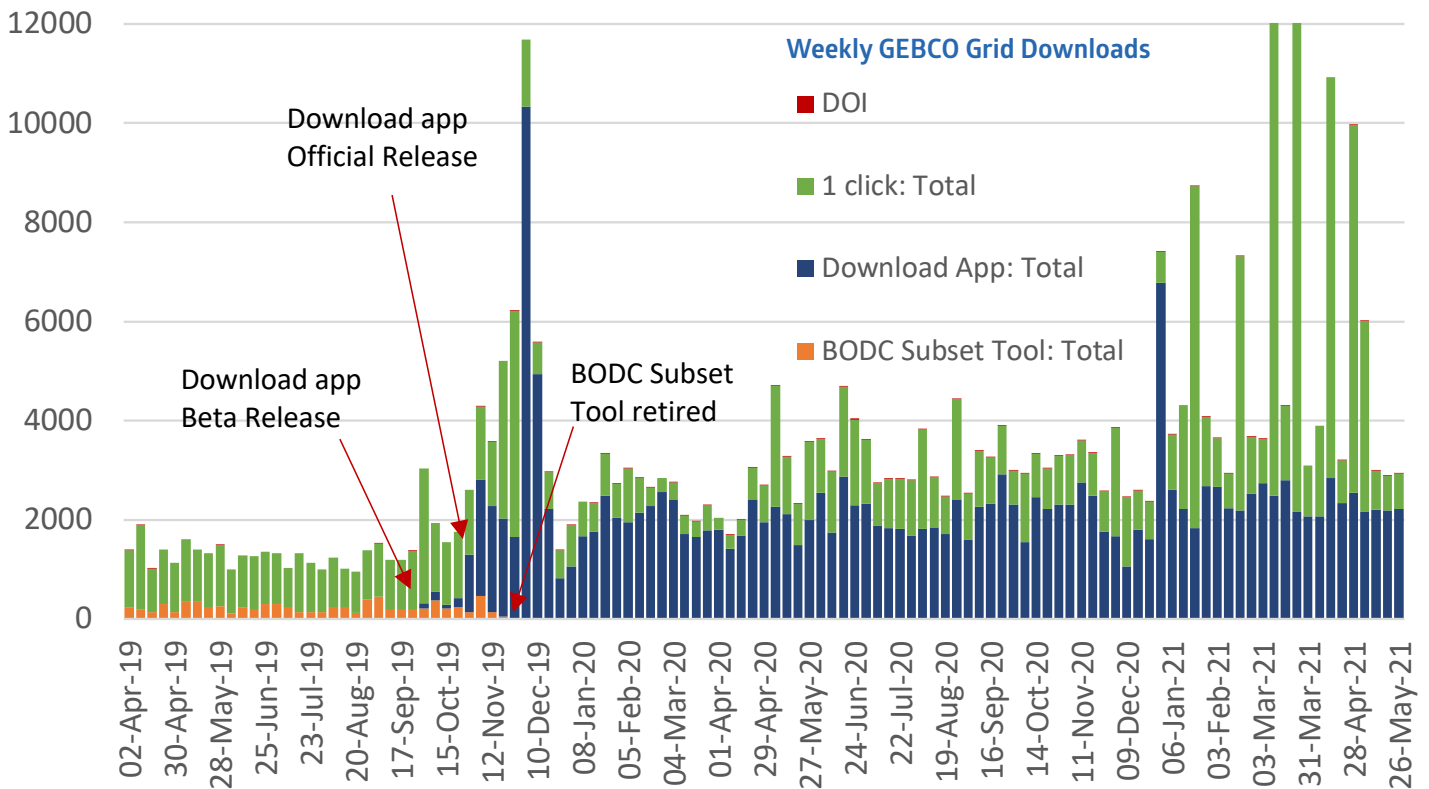
Whilst we have ever increasing observational coverage, we still have more than 75% of the ocean surface where we are relying on predicted bathymetry values. These values are based on satellite derived measurements of gravity anomalies, constrained by observations where possible. The GEBCO grid uses the SRTM15+ grid, generated by the Scripps Institution for Oceanography (SIO), as the base grid. In preparation for a new release of the GEBCO grid, we have worked with the team at SIO, who are partners of the Seabed 2030 Project, to incrementally improve the base grid using new observations and removing any artifacts. This means we were able to use an upgraded version of the grid, SRTM15+ v2.2, for the GEBCO_2021 release.

These images highlight a region of the grid where there were unrealistic holes in the v2.1 grid (first image) where observational data did not fully match the predicted bathymetry. These were identified using a review application provided by the University of New Hampshire Center for Coastal and Ocean Mapping (CCOM) – as shown in the second image – and cleaned by SIO to give the final v2.2 product shown in the third image.



Global Center Updating the global grid *continued*

A pre-release of the grid was made available for public download in May. The final release of the global grid will be released shortly, with the global dataset available in NetCDF, GeoTIFF and ESRI ASCII formats. The grid will also be available through the GEBCO download application (download.gebco.net). Since the new app was introduced in November 2019, we have seen a 10 fold increase in the number of ‘subset’ downloads using this route, and fewer downloads of the global grid. This demonstrates the importance of allowing users to select only the areas they are interested in to download.



Recognising our contributors

Alongside developing the grid, the Global Center team have been working to collate all the information about our contributors. Seabed 2030, and GEBCO, have a wide range of contributors: from our partners, such as EMODNet, who provide us with pre-gridded compilations of multiple organisations’ data, or GMRT, who provide high quality multibeam data from many organisations, through to individuals who have contributed observations from a single cruise. In some cases, there are multiple contributors for a single observation: the organisation that carried out the survey, the data centre that cleaned the data and made them publicly available, and an international coordination activity that included that data in a regional gridded product for us to access. And some contributions cover multiple oceans, and are used by several different Regional Centers. Using information held at Regional Centers, we have been compiling a central database of the contributions we have received. This will allow us to ensure all our contributors are credited appropriately by Seabed 2030 and by GEBCO. We are also collecting the coverage data for all the contributions to allow us to more clearly identify the major gaps in coverage.

Planning for crowd sourced bathymetry

As we look forward to our fifth year of operations, the Global Center is now planning an exciting new initiative: to act as a Seabed 2030 ‘trusted node’ for crowd sourced bathymetry (CSB) data. This will allow us to collect data from individual vessels or companies who wish to contribute, but do not have the capacity to process and submit their own data to the IHO DCDB. We are working with the DCDB to set up the workflows needed and allow users to upload their data directly to us to be included in the grid.

Center Head: Dr Helen Snaithe | gdacc@seabed2030.org

SEABED 2030 CENTERS**Southern Ocean**

The Southern Ocean Regional Center has been continuing to gather and process bathymetric data in the waters around Antarctica. Earlier this year the Polarstern research vessel transited south to supply Germany's Antarctic research station, Neumayer II, and to conduct scientific research in the Weddell Sea. This multi-disciplinary expedition involved oceanographic, biologic, and bio-geochemical components and provided significant bathymetric mapping opportunities. With satisfactory weather and good ice conditions, the captain and chief scientist were often able to accommodate minor route changes along unsurveyed areas between stations. Hydrographic features are paramount for understanding ocean current pathways and the environmental settings of an area, useful when deploying scientific research instruments.

Nearly every night, the Ocean Floor Observation and Bathymetry System (OFOPS), a towed device collecting data in real-time, was deployed in the surveyed area. The distribution of the seafloor habitats could be resolved at less than 50cm resolution using a sidescan sonar system towed 2m above the seafloor with additional live-stream video and camera footage. This multi-resolution information and incredible footage shows the amazing diversity of the Weddell Sea. We also had the opportunity to map an unseen area with this device due to iceberg A74 (roughly 1300 km²) breaking off Antarctica's Brunt Ice Shelf exactly when we arrived. Polarstern passed through and mapped the gap of only a few nautical miles wide and only last seen ice-free 50 years ago.

Ms Laura Hehemann
Data Manager and Curator, IBCSO
southern-ocean@seabed2030.org

Center Head: Dr Boris Dorschel

Atlantic-Indian

Over the past several months, the Atlantic-Indian Regional Center has been focused on assembling data for the GEBCO 2021 grid. Combined with previously contributed data, the Atlantic/Indian regional data product now includes contributions from 40 unique contributors/organizations from 23 countries including government, academic, industry and NGO sources. Some highlights of recent data contributions include data acquired with SEA-KIT during its Two Oceans Two Technologies campaign in 2020, updated grids from EMODnet, GMRT, AusSeabed, and the Brazilian Navy, as well as several data sets acquired and shared by individual researchers and research groups throughout the region. Ongoing data assembly efforts within the center are focused both on processing data made available through the IHO-DCDB and on identifying new data products being built and made available from the growing community of stakeholders throughout the region.

The center staff have led several recent virtual stakeholder engagement events including a webinar series co-organized with IOCAFRICA earlier in the year which has laid the foundation for working with stakeholders to develop a strategy for mapping the seafloor around Africa. As part of the recent All-Atlantic 2021 Conference, the center team collaborated with the Atlantic Ocean Research Alliance (AORA), the Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE), and European Union led efforts including iAtlantic, Mission Atlantic, and Atlas, to co-organize a virtual event focused on mapping in the Atlantic. Additional information about recent events, as well as recordings of presentations can be found through the Atlantic-Indian Regional Center's list of recent events. The team is currently developing plans for additional webinars and events, and will continue to make information about upcoming engagement opportunities available on the [Seabed 2030 website](#).

Center Head: Dr Vicki Ferrini | atlantic-indian@seabed2030.org

SEABED 2030 CENTERS**Arctic-Pacific**

Like all other Regional Centers, the Arctic and North Pacific Regional Data Center shared by Stockholm University and the University of New Hampshire were busy processing newly found or acquired data sets for submission to the GEBCO 2021 grid.

Both teams also participated in a virtual meeting of the Arctic-North Pacific/Antarctic Regional Centers and as well the recent meeting of the GEBCO Guiding Committee. Our teams also hosted applications that allowed for the interactive review of both the SRTM+ and the beta versions of the GEBCO grid. This was done utilizing the Center's GIS server to host a database that could associate a polygon drawn by a reviewer that showed potential issues with each pre-release grid with basic metadata including type of issue being identified, the version of the grid, the regional area it was associated with, and any comments that the reviewer wished to include. In addition to these activities, the Stockholm group were busy receiving data from all centers for the calculation of global coverage (20.6%) at the time of the release of GEBCO2021, supporting crowd-sourced bathymetry efforts in Greenland as well as supporting mapping efforts on the ODEN during the Synoptic Arctic Survey program.

The UNH team has supported the collection of more than 172,000 sq km of multibeam data on Victor Vescovo's PRESSURE DROP and OceanX's OCEAN EXPLORER. Also during this reporting period, the new Saildrone SURVEYOR – an uncrewed sailing vessel with a deep water EM304 multibeam – was launched from San Francisco and is currently enroute to Hawaii. At the time of this submission more than 3000 km have been transited with the collection of more than 20,000 sq. km of multibeam data.

Center co-Heads: Professor Martin Jakobsson and Professor Larry Mayer | arctic-pacific@seabed2030.org

South and West Pacific

Our center has made really great progress with the final delivery made of the contribution of bathymetric data from the South and West Pacific region to the GEBCO 2021 grid. To date, an impressive area covering 24 million square km has been mapped in the region.

Did you know that the NZ Aid Programme Pacific Regional Navigation Initiative (PRNI) started in 2015 with a focus on improving navigation safety in the South West Pacific? Through PRNI, Toitū Te Whenua LINZ has been able to carry out new hydrographic surveys using satellite derived bathymetry, airborne laser bathymetry and multi-beam echo sounders technology. The data collected has been used to improve official nautical charts for the Cook Islands, Niue, Samoa, Tokelau and Tonga. In addition, the bathymetric data is helping improve knowledge of the seafloor and the marine environment. It also supports the establishment of marine protected areas around sensitive reefs and eco-systems, such as Beveridge Reef in Niue. All the data collected is freely available and the bathymetry has been supplied to the South & West Pacific Data Centre.

Also on the news front, we welcomed Miss Jaya Roperez as our new Data Manager. Jaya is a hydrographic surveyor from the Philippines and is a The Nippon Foundation-GEBCO alumni previously based at the University of New Hampshire, USA.

Center Head: Mr Kevin Mackay | pacific@seabed2030.org

NEW PARTNERSHIPS

The UK Hydrographic Office and Teledyne CARIS

On the occasion of World Hydrography Day, Seabed 2030 announced a new partnership with the UK Hydrographic Office (UKHO), a world-leading centre for hydrography specialising in marine geospatial data, and Teledyne CARIS, the leading developer of marine mapping software.

As part of the new agreement, the three organisations will work together to advance the effort associated with producing the definitive map of the seafloor by using a new Artificial Intelligence (AI) tool developed by Teledyne CARIS and the UKHO as part of their ADMIRALTY Maritime Data Solutions portfolio. The AI-Based Bathymetry Data Noise Cleaning Capability is thought to benefit Seabed 2030 by providing processing efficiency of incoming multibeam bathymetry dataset typical of the type to be received by the Project.

Find out more about [UKHO](#) and [Teledyne CARIS](#).



Ocean Exploration Trust

A Memorandum of Understanding has also been signed with the Ocean Exploration Trust (OET).

Ocean Exploration Trust (OET) and the Nautilus Exploration Program aim to explore the ocean, utilizing advanced seafloor mapping and robotic technologies, while connecting that exploration to the world in real-time via a high-bandwidth satellite. Established in the United States in 2007, OET's program is both national and international with OET partnering closely with the NOAA Office of Exploration & Research as well as other government agencies, academic institutions, and the private sector to advance the field of deep-sea exploration and to engage the public and next generation.

The partnership will see Seabed 2030 and OET work collaboratively towards the completion of the definitive map of the seafloor – complementing the Decade of Ocean Science in Support of Sustainable Development.

Find out more about [OET](#).

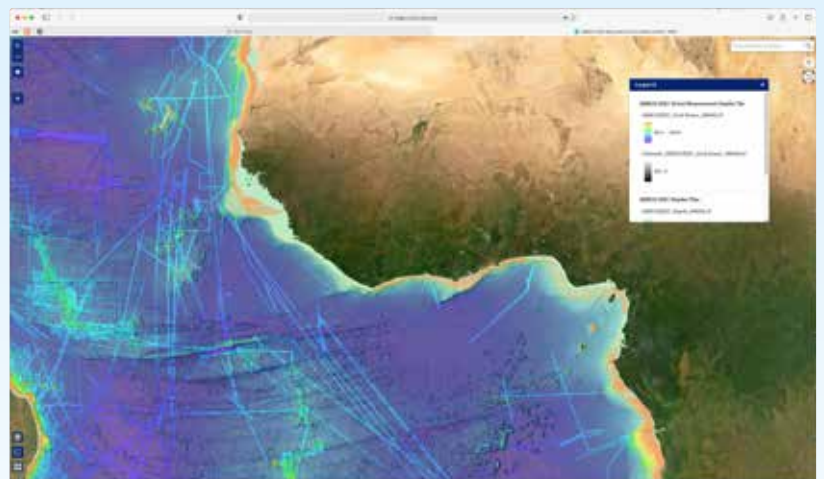


Interactive visualization of GEBCO 2021 grid released

Building on Colin Ware's work developing BathyGlobe, Paul Johnson of the University of New Hampshire has created an interactive globe of the GEBCO 2021 grid which is publicly available to use as a scientific tool or educational aid.

The web app allows users to quickly zoom in on any location, make perspective plots, change basemaps, and turn on and off a layer showing the direct measurements.

Seabed 2030 Project Director, Jamie McMichael-Phillips, commented *"this web app is a fantastic contribution to GEBCO from UNH, and with the potential for increased functionality in the future, it will be an important tool for scientists and non-experts alike as the GEBCO grid grows. The power of visualization helps us to understand how far we have already got and how much further we have to go."*



You can access the web app via the UNH website here.



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