

## EDITORIAL

### One step closer

**As another year draws to a close, it offers a period of reflection. The past 12 months have certainly been eventful for Seabed 2030, and we are proud to have hosted - and participated in - events which highlighted the importance of the ocean, not least for the pivotal role it plays in safeguarding the future of our planet.**

This year Seabed 2030's core team grew with the addition of a new Head of Partnerships and a Head of Communications and Decade Initiatives. Seven new partners formally joined us in our pursuit of the definitive map of the ocean floor and we notably welcomed three additional countries signing up to the project: UK, USA and the Philippines.

We were delighted to play a part in putting ocean mapping on the agenda. In addition to our official Side Event at the second UN Ocean Conference, Seabed 2030 also participated in COP27 in Sharm El-Sheikh, Egypt and the second UN World Geospatial Information Congress held in Hyderabad, India. Other appearances include the Water Days conference in Bad Soden, Germany; the World Ocean Council's Sustainable Ocean Summit (SOS) in Barcelona, Spain; and more recently, at this year's GEBCO Map the Gaps Symposium, held in Southampton, UK.

We were also proud to support the Tonga Eruption Seabed Mapping Project (TESMaP), in response to the eruption of the Hunga Tonga-Hunga Ha'apai (HT-HH) volcano at the start of the year. The results of the investigation by the National Institute of Water and Atmospheric Research (NIWA) - led by NIWA's marine geologist and Seabed 2030 Center Head

Kevin Mackay - were published last month: the eruption was the largest ever recorded. More details on the findings are in this newsletter.

**As we now prepare to enter a new year - bringing us one step closer to 2030 - we are excited to build on this momentum.**

Our mission is an ambitious one and to achieve it, we need everyone. I'm grateful to our partners for their steadfast support throughout the years, and all of us at Seabed 2030 look forward to forging new partnerships and strengthening existing ones in 2023 and beyond.

After all, we can all play a part in this global effort in support of the sustainable use and conservation of the ocean.

***All that's left now is for me to offer my best wishes for the festive season.***



**Jamie McMichael-Phillips**  
Seabed 2030 Project Director

## THE MAP THE GAPS SYMPOSIUM

The Map the Gaps Symposium, a GEBCO event on ocean discovery, took place on 27-28 October in Southampton, UK.

It was a pleasure to see so many people in the hydrospace community attend the first in-person symposium in two years. Seabed 2030 was delighted to host a two-hour session on the first day of the conference. The event, *Progressing Towards Full Ocean Discovery*, was divided into two themes, both moderated by Aileen Bohan (INFOMAR, Geological Survey Ireland), and included presentations from seven experts across industry and academia.

The first theme – *A Mapped World Beyond 2030* – focused on collaborations and explored how we can work together to achieve a fully mapped ocean by 2030. Speakers included David Millar (Fugro), Steve Hall (Seabed 2030) and Nick Lambert (NLAI).

David Millar's presentation focussed on the importance of forming global partnerships, and how ongoing global collaboration is crucial for the future of ocean mapping. Adding: *"The official endorsement of Seabed 2030 by the UN Ocean Decade provides an excellent foundational basis on which to continue to build networks."* Steve Hall shared how we can work with the UN Ocean Decade Collaboration Centres to help build bridges with the Ocean Decade community and inspire countries to get involved. A change in attitude to a more holistic, regenerative approach is required in order to sustain the oceans, said Nick Lambert. *"More ocean data is required to attract investment in the Blue Economy, which in turn brings social and economic benefits to us all."*

The second theme – *Partnerships: A Force Multiplier for Ocean Mapping* – explored how we can spur innovation to support our efforts to map the global ocean. Speakers included Kevin Mackay (NIWA), Leif Bildøy (Kongsberg Maritime), Michael King (Ocean Infinity) and Kim Knauer (EOMAP).

Kevin Mackay gave a fascinating talk on the recent **TESMaP** mission showing how having a before and after map of the seafloor is essential for learning about the undersea impact of volcanic eruptions. Leif Bildøy presented on 'Blue Insight,' which aims to collect, visualize, contextualize, and facilitate the sharing of ocean data. Michael King spoke about innovation in ocean data acquisition and the sharing and use of remote platforms for controlling vessels offshore, adding: *"If you apply technology in the right way, you can acquire vast datasets in a sustainable way."* Finally, Kim Knauer demonstrated how satellite-derived bathymetric data can be used to fill in gaps. *"No mobilization is required, it is cheaper than using vessels and it can cover remote areas that could otherwise not be mapped."*

## SEABED 2030 AT COP27



Head of Partnerships Steve Hall and Seabed 2030's panelists at COP27

Seabed 2030 was honored to be invited by our partner the Woods Hole Oceanographic Institution to take part in activities hosted at their Ocean Pavilion at COP27 in Sharm el Sheikh, Egypt, in November. Seabed 2030's side event, Mapping for People and Planet, brought together a panel of experts to discuss the pivotal role of seabed mapping in safeguarding the future of the planet.

Head of Partnerships Steve Hall moderated a well-attended session featuring Dr Narissa Bax of the South Atlantic Environmental Research Institute at the University of Tasmania, Australia; Dr Sophie Seeyave, CEO of POGO – the Partnership for Observation of the Global Ocean; Dr Bernadette Snow of Nelson Mandela Metropolitan University South Africa, and NOAA Administrator Dr Rick Spinrad from the United States who each gave their perspective on why high-quality mapping of the global seabed is an essential part of the UN Ocean Decade objectives, helping nations, industry and individuals to better-manage ocean resources, adapt to climate change and rising seas, provide safe shipping routes for commerce, access resources, train and empower local communities, and help coastal states maintain their sovereignty and homeland security.

We had excellent questions from the in-person and online audience, and feedback afterwards indicated that participants had found it a very informative and valuable contribution to the plethora of information being shared by the many groups present at COP27.

## SEABED 2030 CENTER UPDATES

### 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.

### Southern Ocean Regional Center

With the publication of version 2 of the International Bathymetric Chart of the Southern Ocean (IBCSO) completed, (see the last edition of *In-Depth*), the focus of the Southern Ocean Regional Center is once again on data, and we are busy preparing for bathymetric data collection during the current Antarctic Season. In the meantime, we have successfully collected bathymetric data during the Bremerhaven to Cape Town transit of the RV Polarstern securing the first data set – but there is more to come. At the end of December, we will be back on board to collect bathymetric data during expedition PS134.

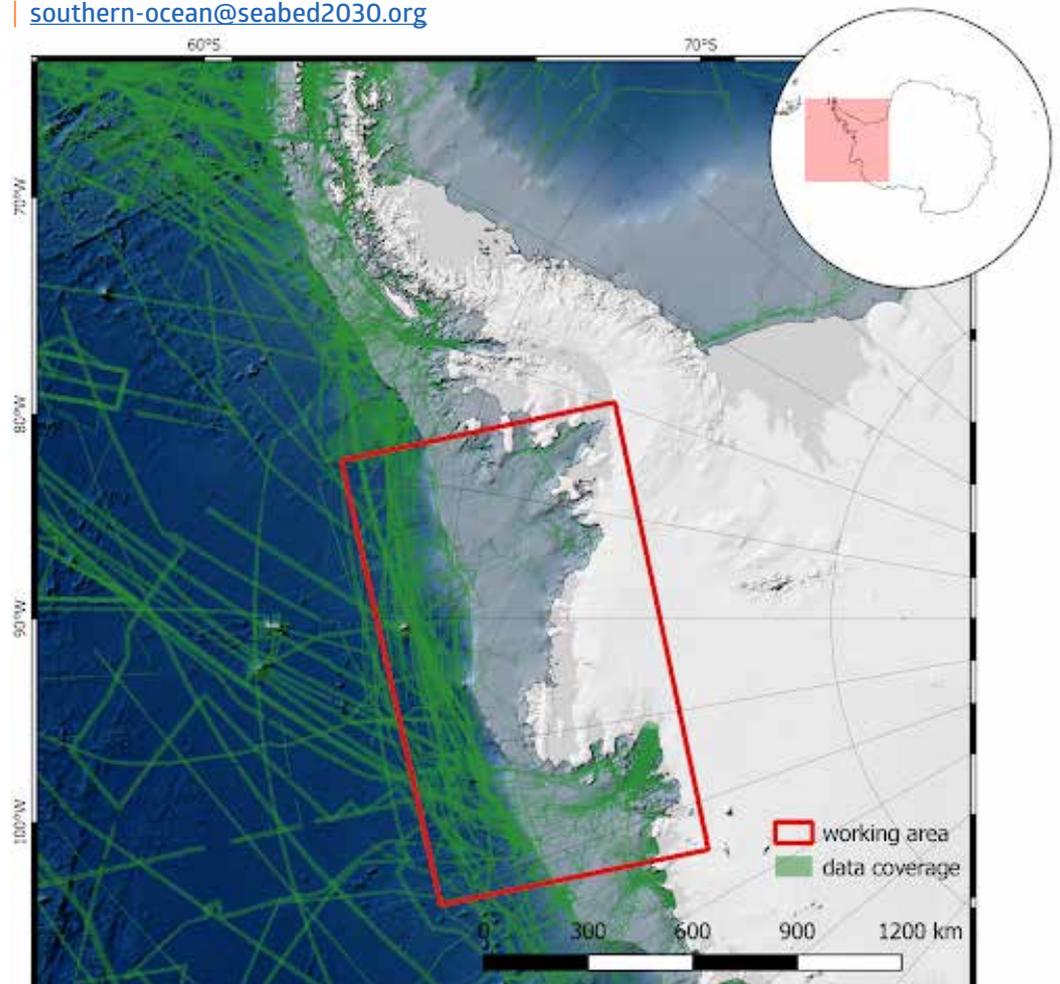
This expedition will target the Bellingshausen Sea where large parts of the shelf are virtually uncharted and we are therefore expecting exciting discoveries. During the expedition, the bathymetry group will be part of the geophysics team, collecting data whenever the ship is moving. Based on these data, glacial landforms such as moraines, drumlins, and mega scale glacial lineations will be identified on the seafloor that again provide insight into the deglaciation history of West Antarctica since the last glaciation maximum.

Understanding the history of the West Antarctic ice shield provides crucial information on the stability and dynamics of this ice sheet, which is of particular importance for modelling possible future responses resulting from global warming. Currently, West Antarctica is among the most rapidly warming areas on the planet. This information provides a key data set, enabling us to better understand the processes involved.

Center Head: Dr Boris Dorschel | [southern-ocean@seabed2030.org](mailto:southern-ocean@seabed2030.org)

Image depicts existing data coverage (green) and the working area of expedition PS134 within the red box.

*Credit: Southern Ocean Regional Center*



## Atlantic – Indian Regional Center

The Atlantic and Indian Oceans Regional Mapping Community Meeting was held virtually at the end of July. This meeting gathered nearly 100 participants from 30 countries and showcased 21 presentations reporting on technical advances, uses of seabed mapping data and progress toward collaboration (Figure 1a). Videos and a full report of the meeting can be found on the [Seabed 2030 website](#).



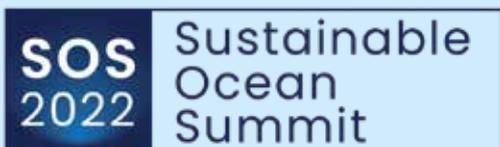
Some of the participants of the Atlantic-Indian Regional

Recent community engagement efforts also included contributing content to multiple Regional Hydrographic Commission meetings through collaboration with CSB/Seabed 2030 Coordinators for the North Indian Ocean Hydrographic Commission (NIOHC), Southwest Atlantic Hydrographic Commission (SWAtHC) and East Atlantic Hydrographic Commission (EAtHC). During a Marine Safety Information (MSI) workshop organized by the Southeast Pacific Hydrographic Commission (SEPHC), Center Head Dr Vicki Ferrini presented an overview of openly accessible bathymetry data and tools. Data Manager, Tinah Martin, attended the 12th Western Indian Ocean Marine Science Association (WIOMSA) Symposium to strengthen engagement and provide an update on project status.

Recent data contributions include several data sets made publicly available by collaborators in France including historic grids from the Atlantic and Indian Oceans, and transit data that were collaboratively acquired through the Ocean Frontiers Mapping Program. Collaboration with TCarta - a Seabed 2030 partner - enabled the integration of multiple satellite derived bathymetry grids, the largest of which covers 121,000 km<sup>2</sup> in the Caribbean.

Team members also contributed to engagement activities that inform students and early career scientists about Seabed 2030 and ocean mapping. Four data apprentices helped the team process and review bathymetry data for integration into regional data products during their summer breaks. A recent geoscience data resources workshop at Lamont-Doherty Earth Observatory saw Data Manager Hayley Drennon give a presentation on Seabed 2030, as well as demonstrating how to use the GEBCO Gridded Bathymetry Data Downloader and identify gaps in data coverage that can be filled on transits during oceanographic research cruises. Finally, the Center is delighted to welcome Sheila Cáceres to the team who will be assisting with data processing and management.

Center Head: Dr Vicki Ferrini | [atlantic-indian@seabed2030.org](mailto:atlantic-indian@seabed2030.org)



**OCEAN-CLIMATE-BIODIVERSITY**  
 Synergies and Solutions for Ocean Sustainability

### SOS 2022

Seabed 2030 Project Director Jamie McMichael-Phillips joined a panel at the 2022 World Ocean Council's Sustainable Ocean Summit (SOS), which took place 17-18 October in Barcelona.

Jamie joined a panel on 'SMART Ocean-SMART Industries', exploring effective ways of coordinating between ocean scientists and ocean industry operators in order to engage industry in data collection and sharing in support of the Ocean Decade.

## South and West Pacific Regional Center

Based at New Zealand's NIWA, the South and West Pacific Center has had a busy few months following the January 2022 violent eruption of the HT-HH volcano within the Kingdom of Tonga.

Funded by The Nippon Foundation, scientists from NIWA lead a voyage onboard their research vessel *Tangaroa* between 9 April and 6 May to identify changes in the seafloor, measure the geological and ecological impacts of the eruption, and investigate the changes in the water column oceanography. 

Conclusions from the data analysis have recently been published.



Ash samples were collected on the sea floor close to the volcano *Credit: Rebekah Parsons-King / NIWA – The Nippon Foundation*

Lastly, we have a new addition to our Center and are happy to be welcoming Belén Jiménez Barón to our team as the new Data Manager. With over ten years' experience in Hydrographic Surveying, Belén has worked across Europe and South America, covering a variety of projects from dredging, offshore construction, nautical charting and marine research. She also worked as a Hydrographic Data Specialist at the Danish Geodata Agency, where she led the implementation of the new bathymetric database, sailed several survey campaigns in Greenland and participated in IHO working groups, including [CSBWG](#) and [HSWG](#). Her passion for ocean mapping, together with her adventurous and altruistic mindset, brought her to Seabed 2030, with the dream of taking part in the global effort towards a fully mapped ocean.

Center Head: Mr Kevin Mackay | [pacific@seabed2030.org](mailto:pacific@seabed2030.org)

## Water Days

Seabed 2030 Head of Partnerships Steve Hall delivered a keynote on the first day of this year's Water Days conference which was held 4-6 October. The focus of the first day was on satellite-derived bathymetry (SDB) and Steve's presentation ([watch here](#)) focused on the importance of seabed mapping and the essential role of SDB.

**TESMAP**

## TESMaP findings are in:

### Tonga eruption confirmed as largest ever recorded

Research into January's eruption of the underwater Tongan volcano has now been completed.

Earlier this year, NIWA and The Nippon Foundation announced a collaborative mission - supported by Seabed 2030 - to discover the undersea impacts of January's eruption of the underwater Tongan volcano. This research has now been complete with astonishing results, including confirmation that the volcano emitted the biggest atmospheric explosion recorded on Earth in more than 100 years.

NIWA discovered that almost 10km<sup>3</sup> of seafloor was displaced – the equivalent to 2.6 million Olympic-sized swimming pools and a third more than initial estimates – with two-thirds coming from the summit and the rest from the surrounding flanks. Three-quarters of this material was deposited within 20km of the volcano, leaving almost 3.2km<sup>3</sup> unaccounted for.

The project leader, NIWA marine geologist and Seabed 2030 Center Head Kevin Mackay, said this missing debris could be partly explained by aerial loss: "This is why we didn't notice the loss until we had mapped everything. The eruption reached record heights, being the first we've ever seen to break through into the mesosphere.

*"It was like a shotgun blast directly into the sky. The volume of this 'shotgun' plume is estimated to be 1.9km<sup>3</sup> of material, which has been circulating in our atmosphere for months, causing the stunning sunsets we saw following the eruption. This goes some way to explaining why we're not seeing it all on the seafloor."*

Despite the huge displacement of material, the volcano's flank remains surprisingly intact. However, the caldera, or crater, is now 700m deeper than before the eruption and further evidence from the caldera shows signs that HT-HH is still erupting.

The significant reshaping of the seafloor also had dramatic effects on ecosystems in the region. There was little sign of any animal life on the flanks of the volcano, in deeper water channels, and most of the surrounding seafloor. However, there were patches of abundant life that had survived the eruption on several seamounts, giving hope for recovery.

Seabed 2030 Project Director Jamie McMichael-Phillips said that this project highlights the benefits of working in collaboration to collect fundamental knowledge of the ocean seabed: *"TESMaP is a fantastic testament to what can be achieved if we all come together in pursuit of scientific research. A complete map of the ocean floor is a necessity to protect our planet in line with the UN SDGs and our Seabed 2030 partners play an invaluable role in helping us realise our goal – as demonstrated by the truly collaborative nature of TESMaP."*

Seabed 2030 is particularly grateful to our partners Esri, QPS and Teledyne CARIS for supporting this mission.



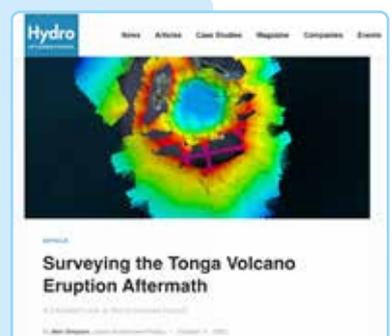
Hunga Tonga-Hunga Ha'apai erupting on January 14, 2022



This video, shot on board NIWA's RV Tangaroa, shows the scale of the HT-HH explosion and the findings of the resulting undersea investigations.

### Aftermath

Jamie McMichael-Phillips co-authored an article with SEA-KIT's Ben Simpson for Hydro International. The article offers a detailed look at the undersea impact of the eruption.



**NEW PARTNERSHIPS**

**PGGM**

Seabed 2030 has entered into a new partnership with the Brazilian Program of Marine Geology and Geophysics (PGGM).

Founded in 1969, the PGGM is a network of Brazilian academic and scientific institutions working to develop the understanding of the Brazilian continental margin and the adjacent ocean basin - the South Atlantic. The organisation, which is hosted at the Federal University of Espírito Santo's oceanography department, contributes to the country's environmental management policies, as well as scientific research activities.

Find out more about PGGM. 



**NAMRIA**

A memorandum of understanding has also been signed with the National Mapping and Resource Information Authority (NAMRIA) of the Philippines.

As the country's central mapping agency, NAMRIA - an attached agency of the Philippines' Department of Environment and Natural Resources - is mandated to provide the public with mapmaking services and to act as the central mapping agency, depository, and distribution facility for natural resources data in the form of maps, charts, texts and statistics. The partnership makes the Philippines the first member of the Association of Southeast Asian Nations (ASEAN) to sign up to Seabed 2030.

Find out more about NAMRIA. 



**UN World Geospatial Information Congress 2022**

Seabed 2030 was delighted to participate in the 2nd UN World Geospatial Information Congress which took place in Hyderabad, India. Project Director Jamie McMichael-Phillips joined a session exploring 'Integrated Marine Geospatial Information for Sustainable Oceans, Seas and Coastal Zones'. Jamie also moderated a conversation on 'Operational Framework for Integrated Marine Geospatial Information for Sustainable Oceans, Seas and Coastal Zones'.