



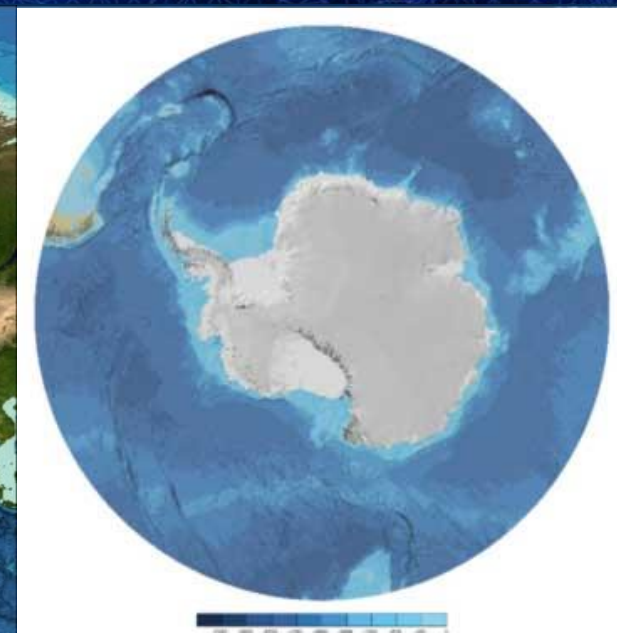
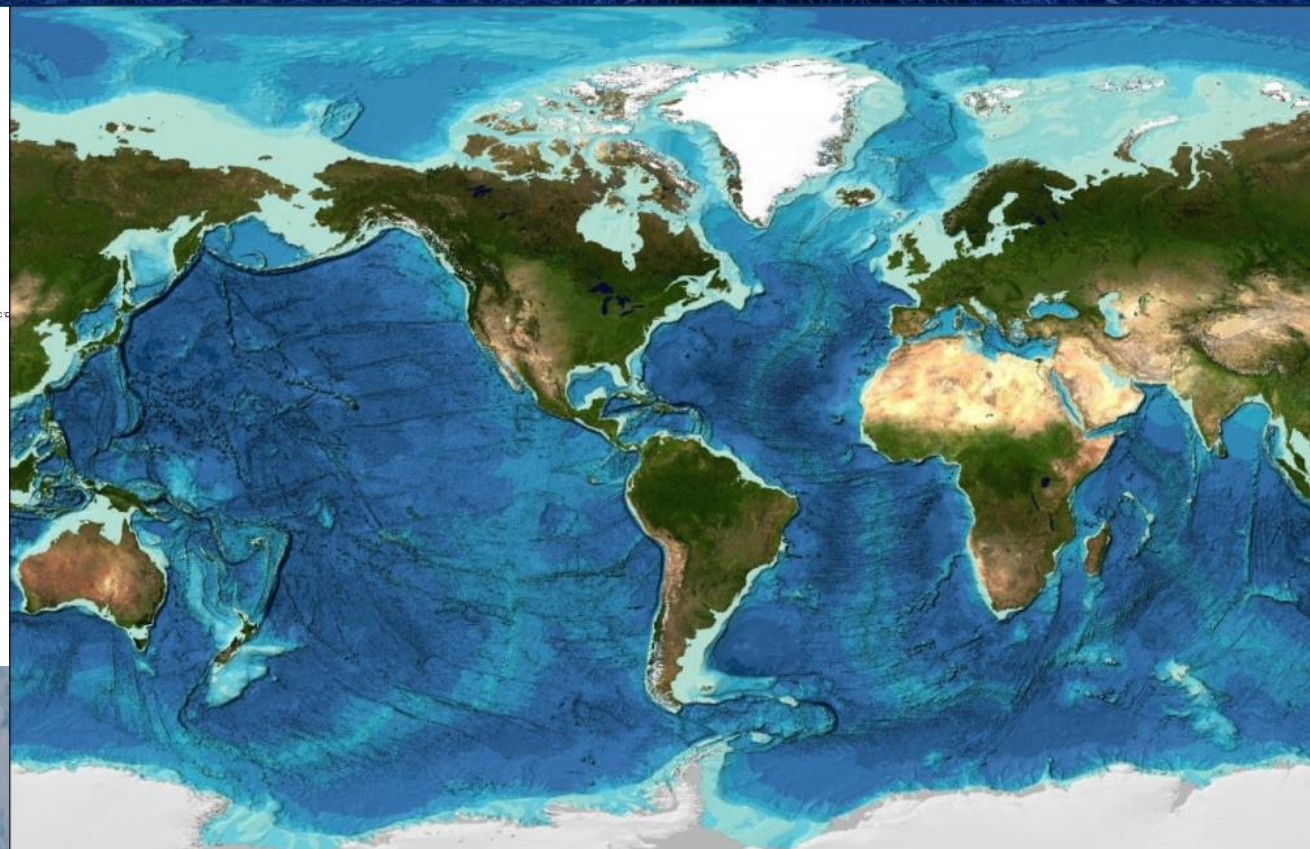
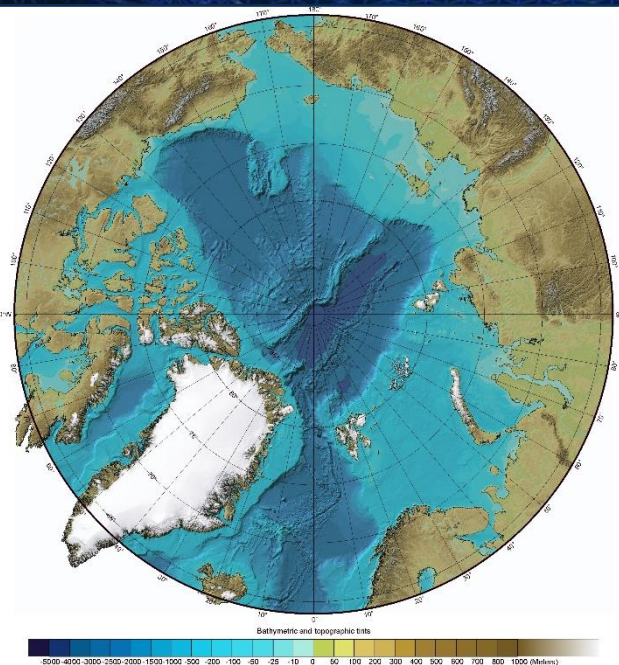
GEBCO

# GEBCO



IHO

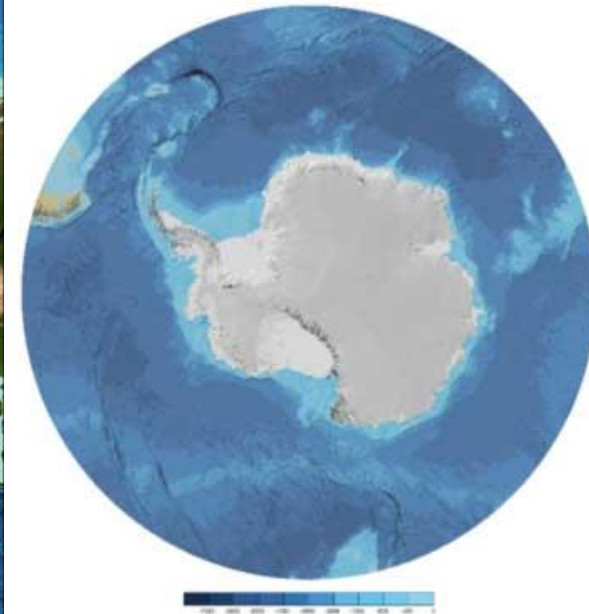
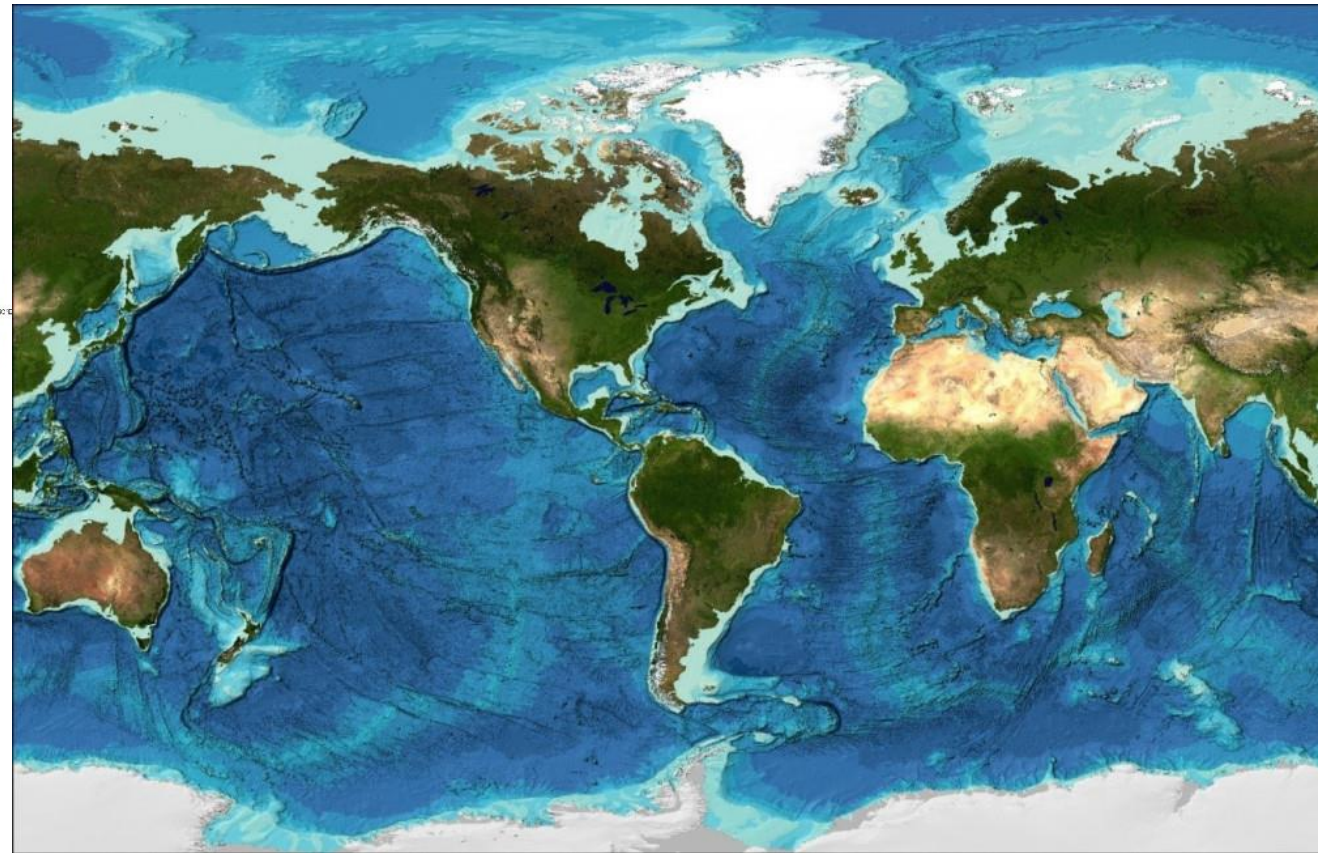
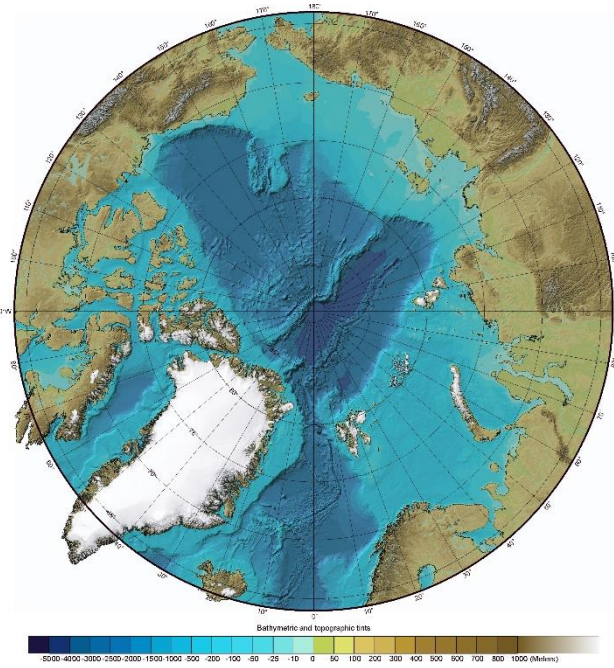
International Hydrographic Organization



**The last great mapping endeavor of our planet**



# GEBCO, building partnerships for ocean mapping





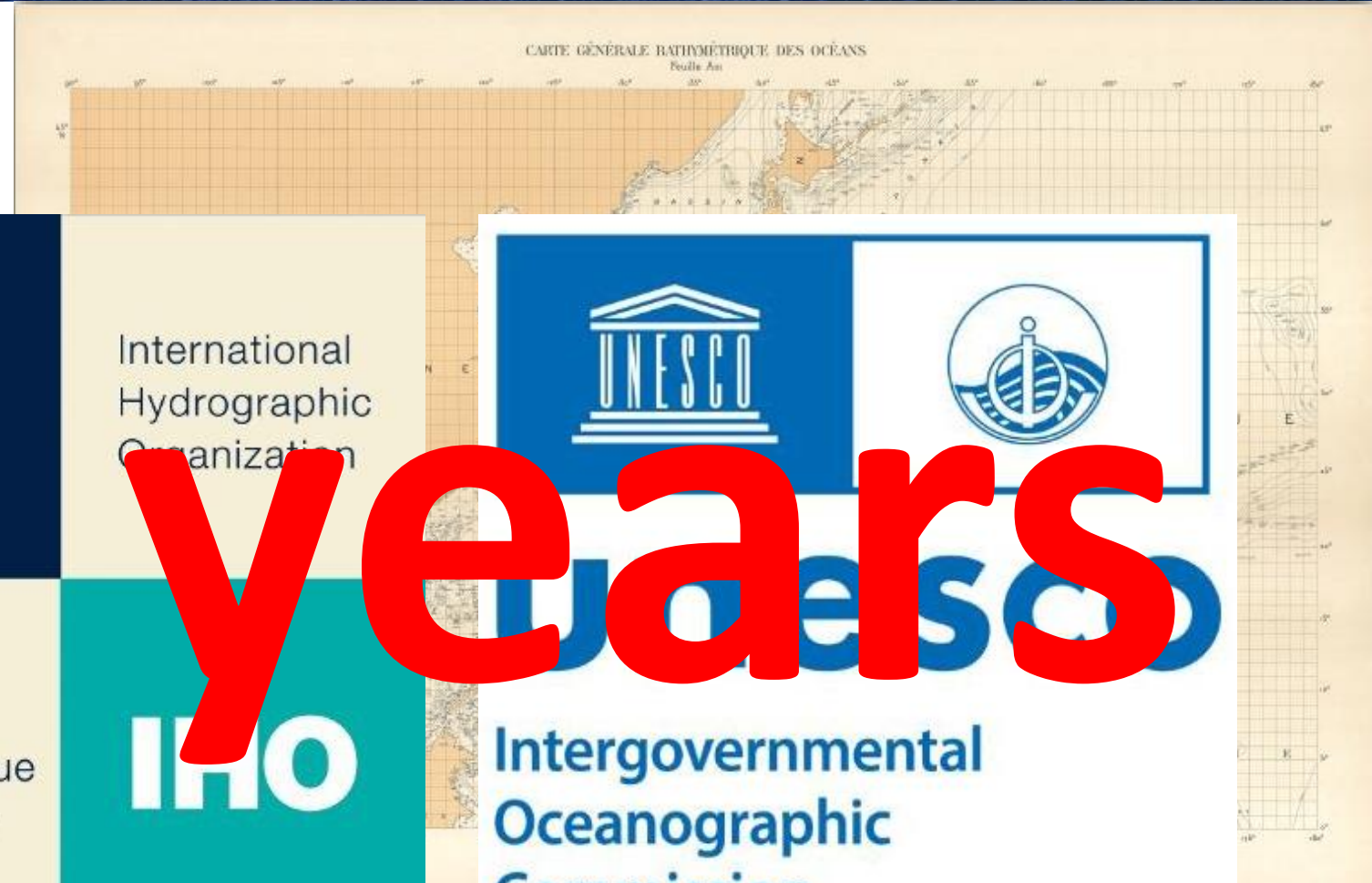
GEBCO aims to provide the most authoritative, publicly available bathymetry data sets for the world's oceans.

[Download GEBCO's global grid](#)

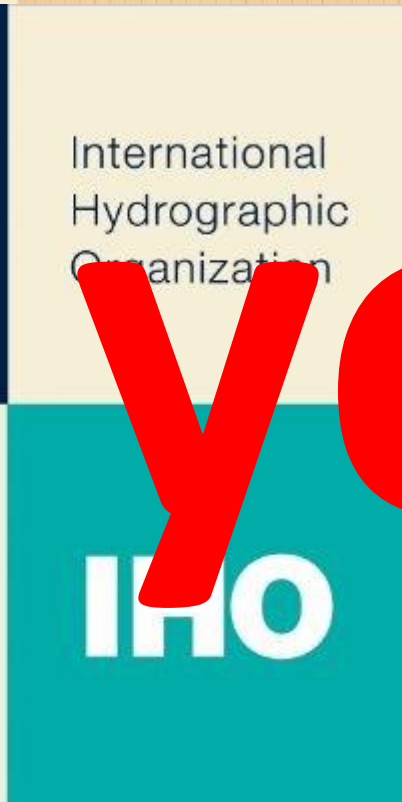
[Download polar grids](#)

[Contribute data](#)

GEBCO program established in 1903, first edition 1905



# 120 years



GEBCO



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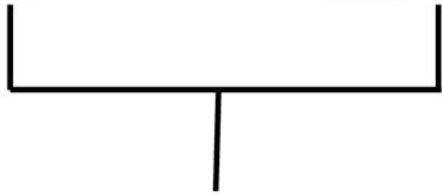
International Hydrographic Organization



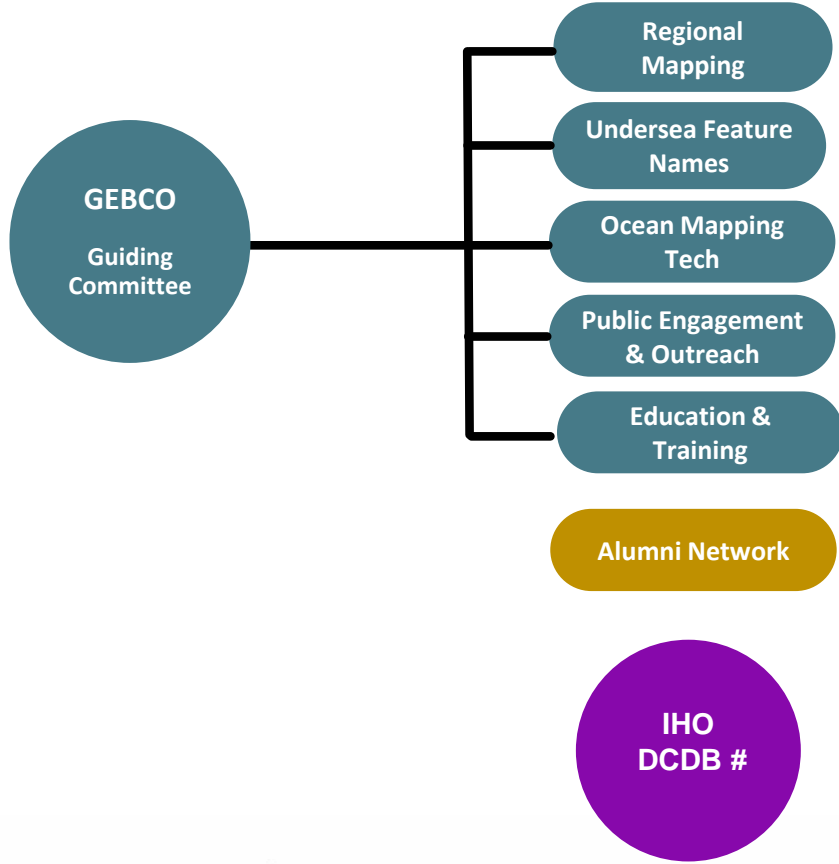
United Nations Educational, Scientific and Cultural Organization  
Intergovernmental Oceanographic Commission



# GEBCO



GEBCO Guiding Committee



GEBCO



# GEBCO-SB2030-CSB developments

- GEBCO strategy
- Governance review
- 1903-2023: 120 years of Ocean discovery: IHO + IOC Assembly
- Proposal for NHC-SB2030 MoU
- Work started to get IHO CSB initiative endorsed as UN Decade action



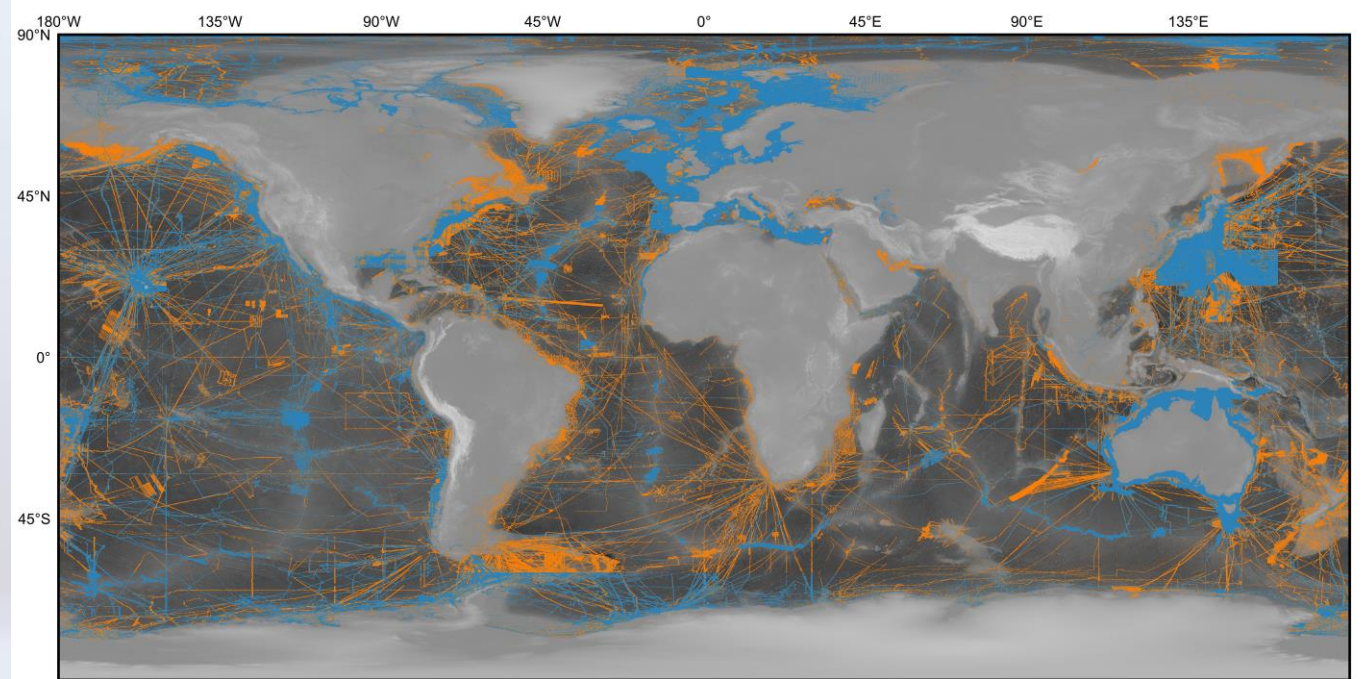
GEBCO



## Progress so far...

### GEBCO 2022 Grid Delivery

- GEBCO Grid stood at 6% coverage when Seabed 2030 began
- Ocean mapping coverage now stands at **23.4%**

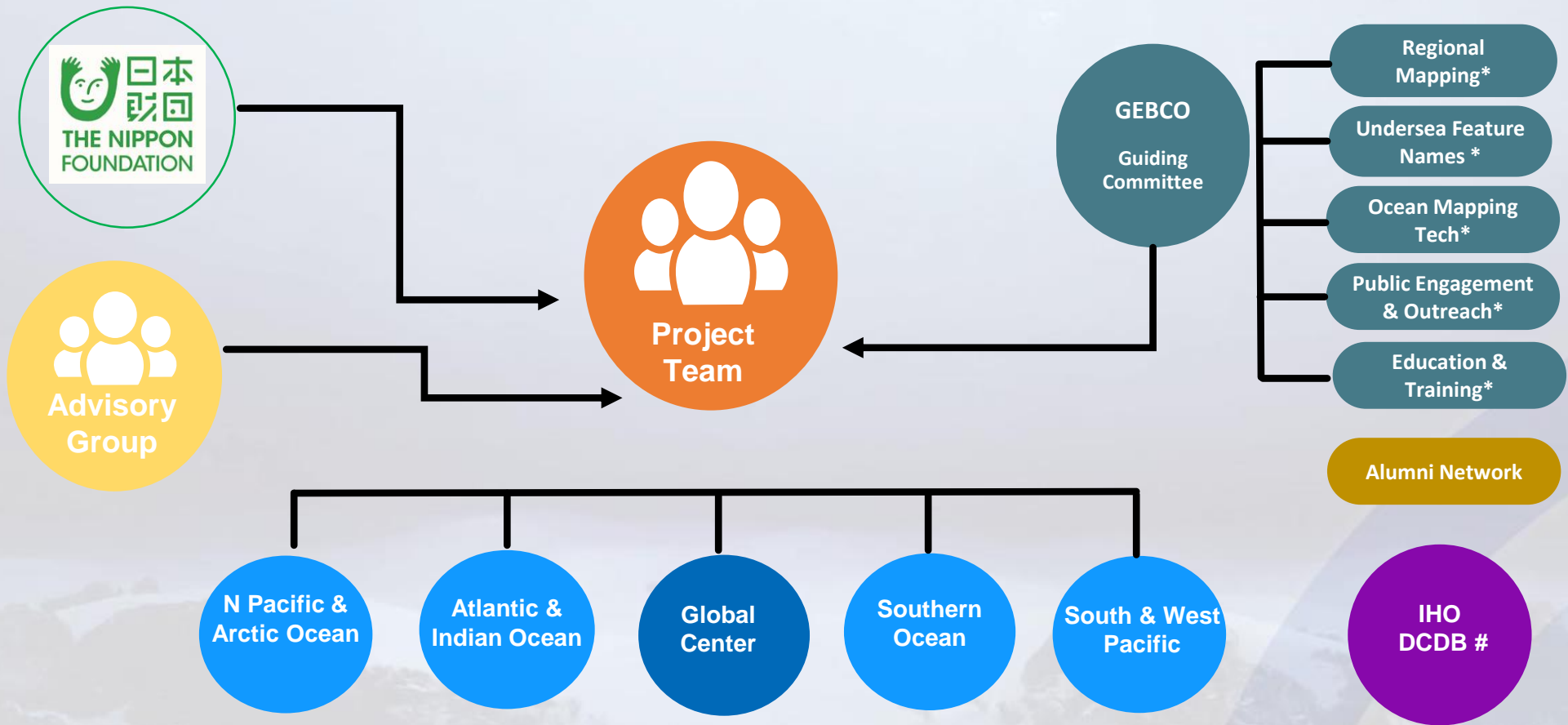


- GEBCO 2014
- Data additions to 2021

Courtesy: Martin Jakobsson, SU



# Seabed 2030 Network



**4 “Regional Centers” + 1 “Global Center”**

(\* GEBCO Sub Committees)

(# Data Centre for Digital Bathymetry)



THE NIPPON FOUNDATION-GEBCO

# SEABED 2030

Update for Project Year 6  
Q1 and Q2 (Aug 22 - Jan 23)

Jamie McMichael-Phillips  
Project Director

*10 February 2023*



***Project Update for Project Year 6  
Q1 and Q2 (Aug 22 – Jan 23)***

**Update by Project Work Packages:**

**WP1 – Data**

**WP2 – Systems & Tools**

**WP3 – Technology Innovation**

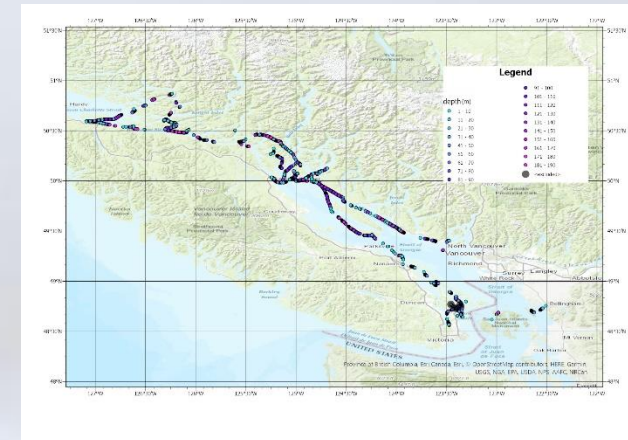
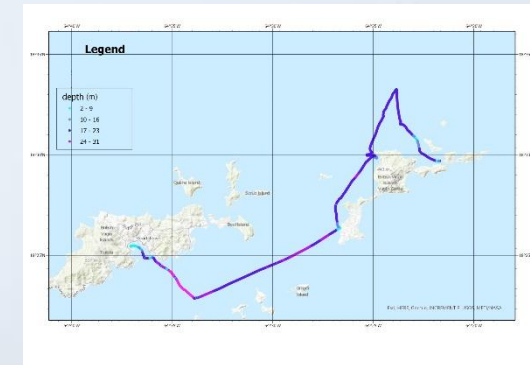
**WP4 – Mapping Activities**

**WP5 – Management**



# WP1 – Data

- **Grid quality improvement: new SRTM+15 data set received from Scripps**
  - To be used as base for GEBCO\_2023 Grid.
- **GEBCO\_2023 Grid to be released in May 2023.**
- **GDACC now fully established as a CSB Trusted Node**
  - Work ongoing to streamline processing procedures.
  - Good number of datasets received from Int'l Seakeepers Society
  - Visualization graphics providing feedback for participants.
- **Data ingestion:**
  - Data exchange with NZ, Kiribati, Japan, Philippines & others.
  - SDB data from Caribbean, Middle East, Indian Ocean regions.
  - New data from AusSeabed & EMODnet to be integrated into 2023 release.



## WP2 – Systems & Tools

- Ongoing improvements to streamline online process for uploading multiple datasets.
- Software tools under development across Regional Centers to optimize data collection including:
  - GapFiller, Wiki site for exchange of ideas/information and GeoMapApp.
- Multi-resolution concept prototyped; development of solution is underway with tech meetings in February/March 2023.
- Preparation of proposal for long-term data collection system using German research icebreaker *RV Polarstern*.



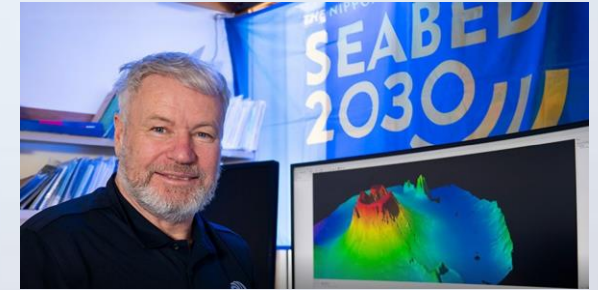
## WP3 – Technology Innovation



- **Simpler & faster gridding method developed.**
  - Now being fine-tuning.
- **Work ongoing on new technologies for increasing the efficiency & decreasing cost of global mapping work.**
- **Kongsberg, UNH and iXblue partnered to develop a compact sonar system:**
  - small enough to fit on a small autonomous vessel.
  - **Prototype due to be trialled April 2023 via *DriX Autonomous Surface Vessel.***

# WP4 – Mapping Activities

- **TESMap voyage**
  - field operations completed by August 2022;
  - data processing and reporting completed by end of 2022.
- **Saildrone Surveyor expedition**
  - 16,254 sq. km of new data collected during deployment to Aleutian Island region.
- Transit data collection by *RV Polarstern* and *RV Maria S. Merian* ongoing throughout reporting period.
- **Satellite Derived Bathymetry (SDB)**
  - Philippines data delivered by EOMAP.
  - French Polynesia project under consideration.
- Ongoing engagement across IHO Regional Commissions.



# WP5 – Management

- Year 5 Annual Report completed with financial report in progress.
- Wind-In-The-Sails work ongoing to produce global mapping prioritization model.
  - Engagement with wider community via workshops with NLA International.
  - Survey that will inform next stage to go live in February 2023.
- Ongoing engagement of alumni in Project-related activities
  - including TESMap, CSB activities and Center work.
- MOU and supporters growing:
  - 5 new MOUs this period (overall total 36)
  - 22 MOUs under negotiation (various stages)
  - 225 supporters total (up from 192 at end of Y5, Q4)



## WP5 – Management (cont'd)

- External engagement and networking continues.
  - More in-person events than virtual for first time since COVID-19
  - Some events retaining hybrid format.
- Significant events:
  - Side Event at COP27, Sharm el Sheikh
  - 2nd United Nations World Geospatial Information Congress, India
  - East Asia Hydrographic Commission Scientific Conference
  - Map the Gaps/GEBCO Symposium
  - Australian Marine Sciences Association meeting
  - .... and many more .....





## WP5 – Management (cont'd)

- In Q3 (Feb-Apr) participated in the following significant events:
  - Oceanology International Americas (Feb)
  - Economist 10<sup>th</sup> World Ocean Summit & Expo (Feb)
  - Our Ocean 2023 (Mar)
  - UK Centre for Seabed Mapping Showcase (Mar)
- Looking ahead to Y6 End (Jul 23)
  - US Hydro 2023 Conference (Mar)
  - IHO-Yacht Club of Monaco CSB Event (Mar)
  - Ocean Business (Apr)
  - Geospatial World Forum (May)
  - IHO Assembly (May)
  - ARTofMELT 2023 Expedition (May)
  - Benelux Hydrographic Society Seminar (May)
  - Oceans 2023 (Jun)
  - NF-GEBCO Alumni Conference (Jul/Aug)



# IBCAO data sources (13 March 2023)

*(New data to be included in spring 2023:  
92 MB NOAA/MGDS datasets + MB 2022  
data from S. Danielson & MB 2021 from  
B. Coakley)*

Blue: old datasets

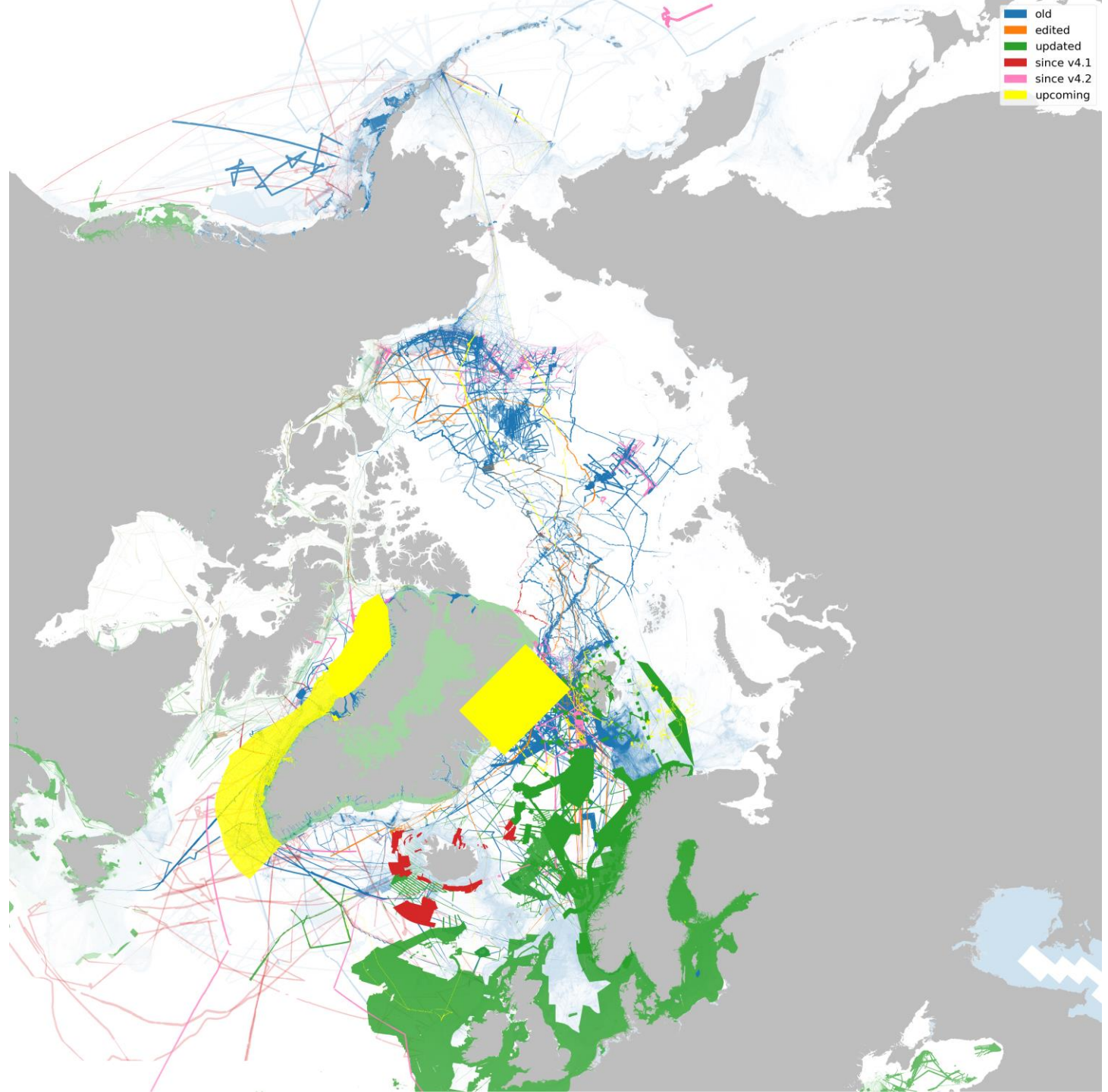
Orange: edited/modified datasets

Green: updated compilations (e.g., EMODnet)

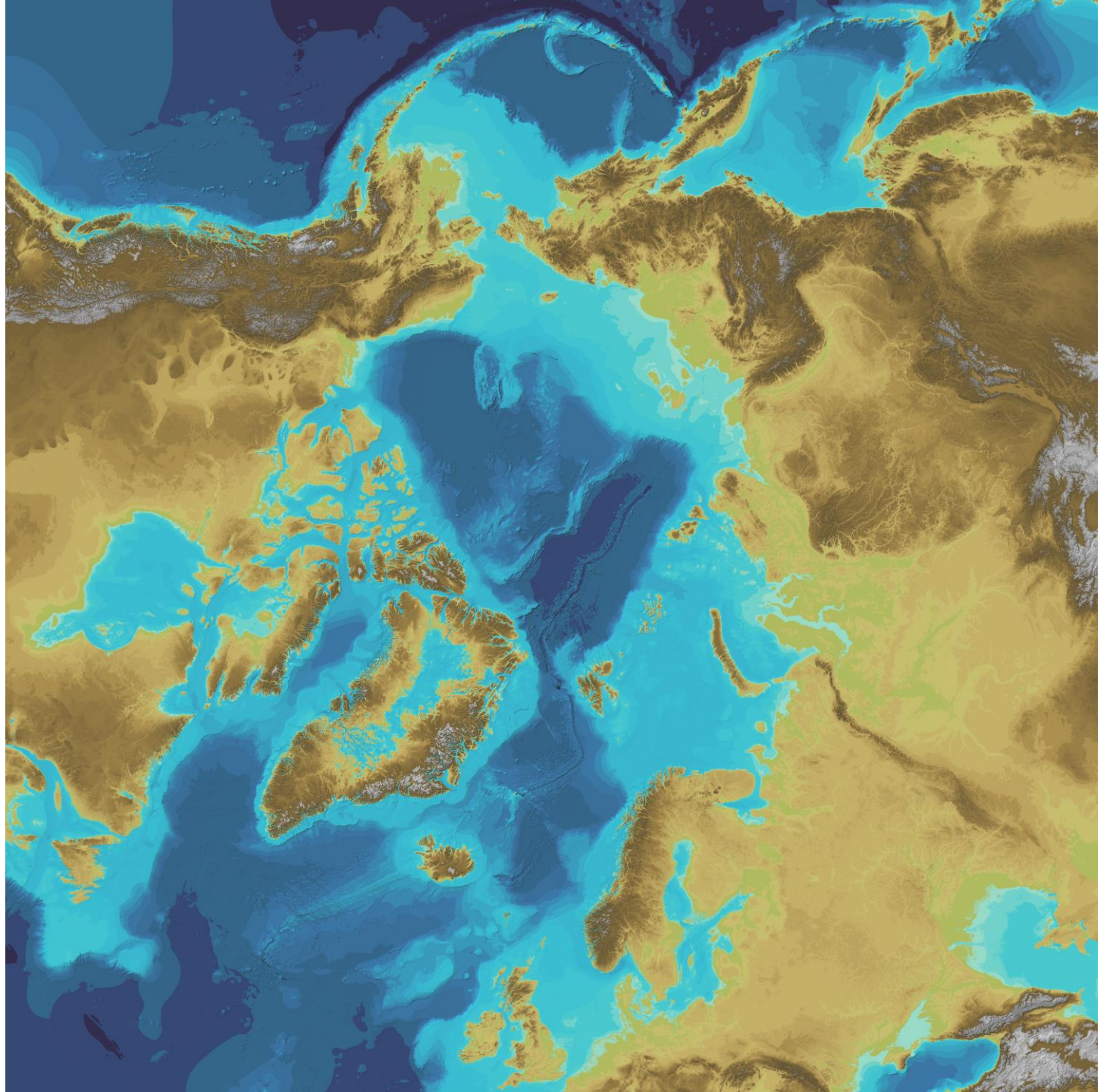
Red: new datasets since IBCAO v. 4.1

Pink: new datasets since IBCAO v. 4.2

Yellow: upcoming datasets (not yet in IBCAO)



IBCAO depth data  
(13 March 2023)





# Crowdsourced Bathymetry

Evert Flier

NHC CSB/Seabed 2030 Coordinator  
CSBWG Member





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# The IHO Crowdsourced Bathymetry Initiative

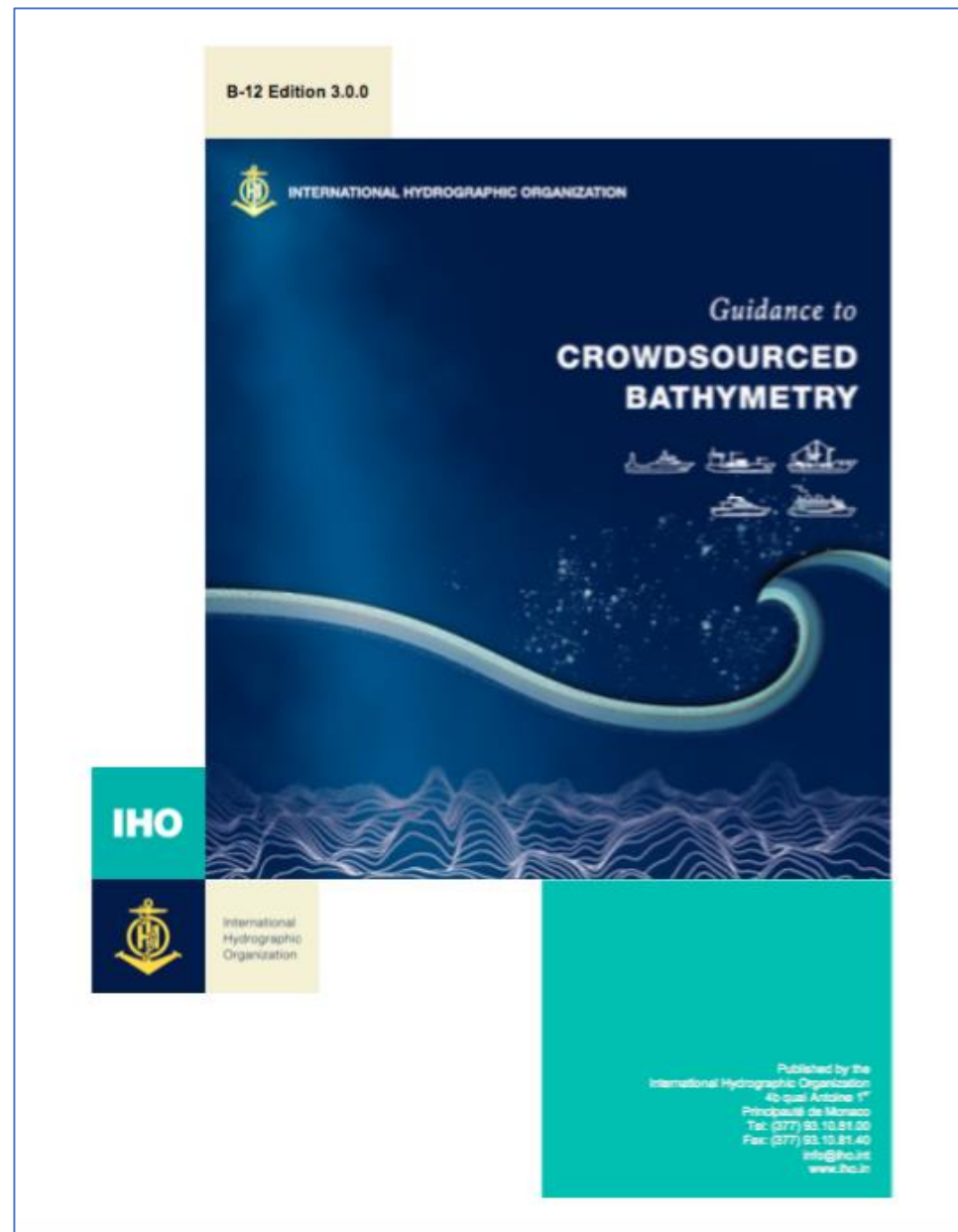
International  
Hydrographic  
Organization

## **CL 25/2022 requested approval of B-12 IHO Guidance on Crowdsourced Bathymetry Edition 3.0.0**

Updates include: incorporating feedback from operational use and experience, making the document more "equipment agnostic", simplifying the document and making it more accessible to ALL readers (data collectors, providers and users).

**APPROVED!!**

[iho.int/uploads/user/pubs/bathy/B\\_12\\_CSB-Guidance\\_Document-Edition\\_3.0.0\\_Final.pdf](https://iho.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf)





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IHO CL 01/2020

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Organization

- All coastal States are requested to indicate their position on the ***provision of CSB data*** from ships within waters subject to their jurisdiction into the public domain
- To date, 33 coastal States (**green**) have replied positively\*
- ***Denmark, Finland, Iceland, Norway, Sweden***

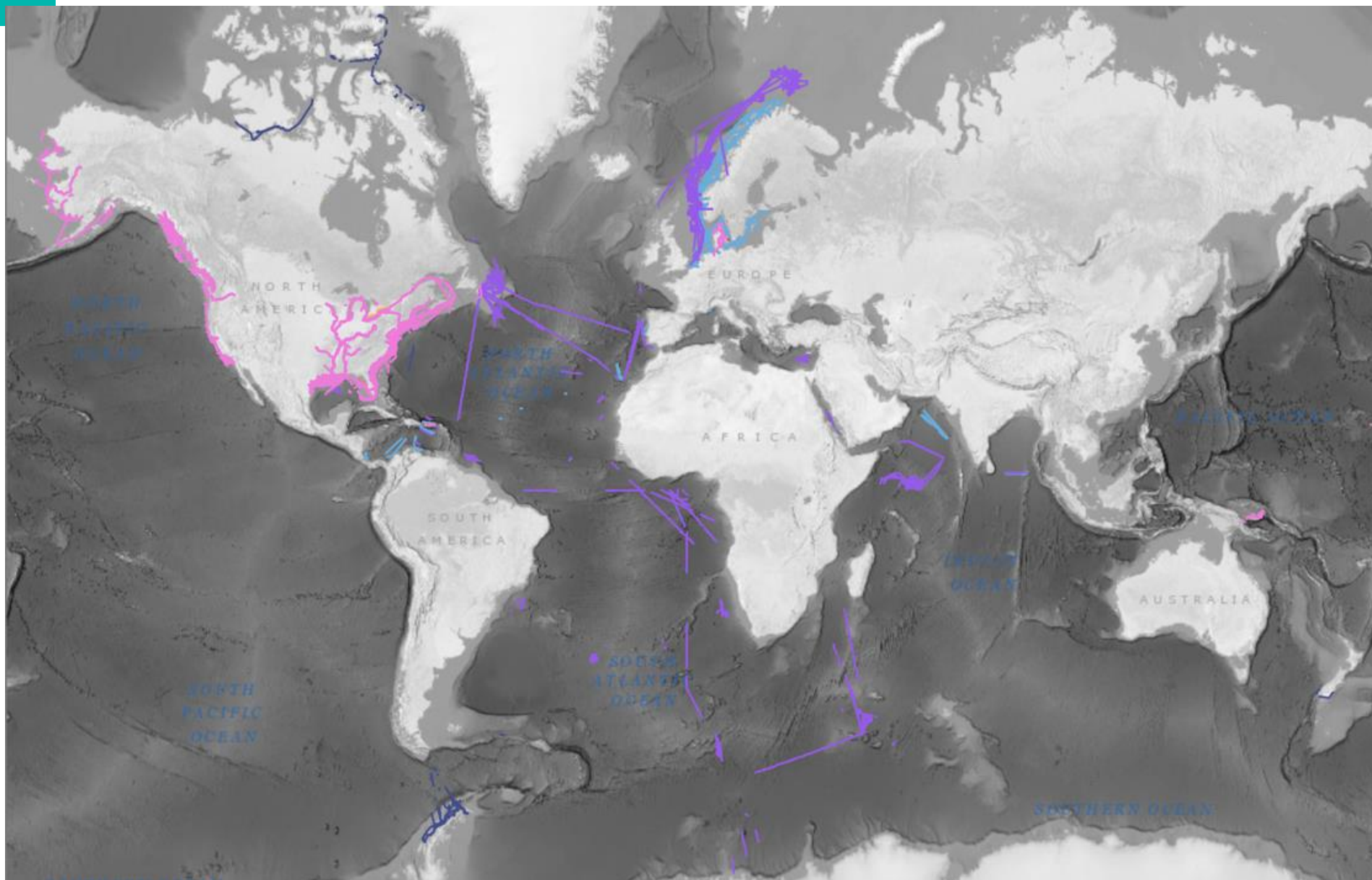




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# CSB Data Holdings

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Hydrographic  
Organization

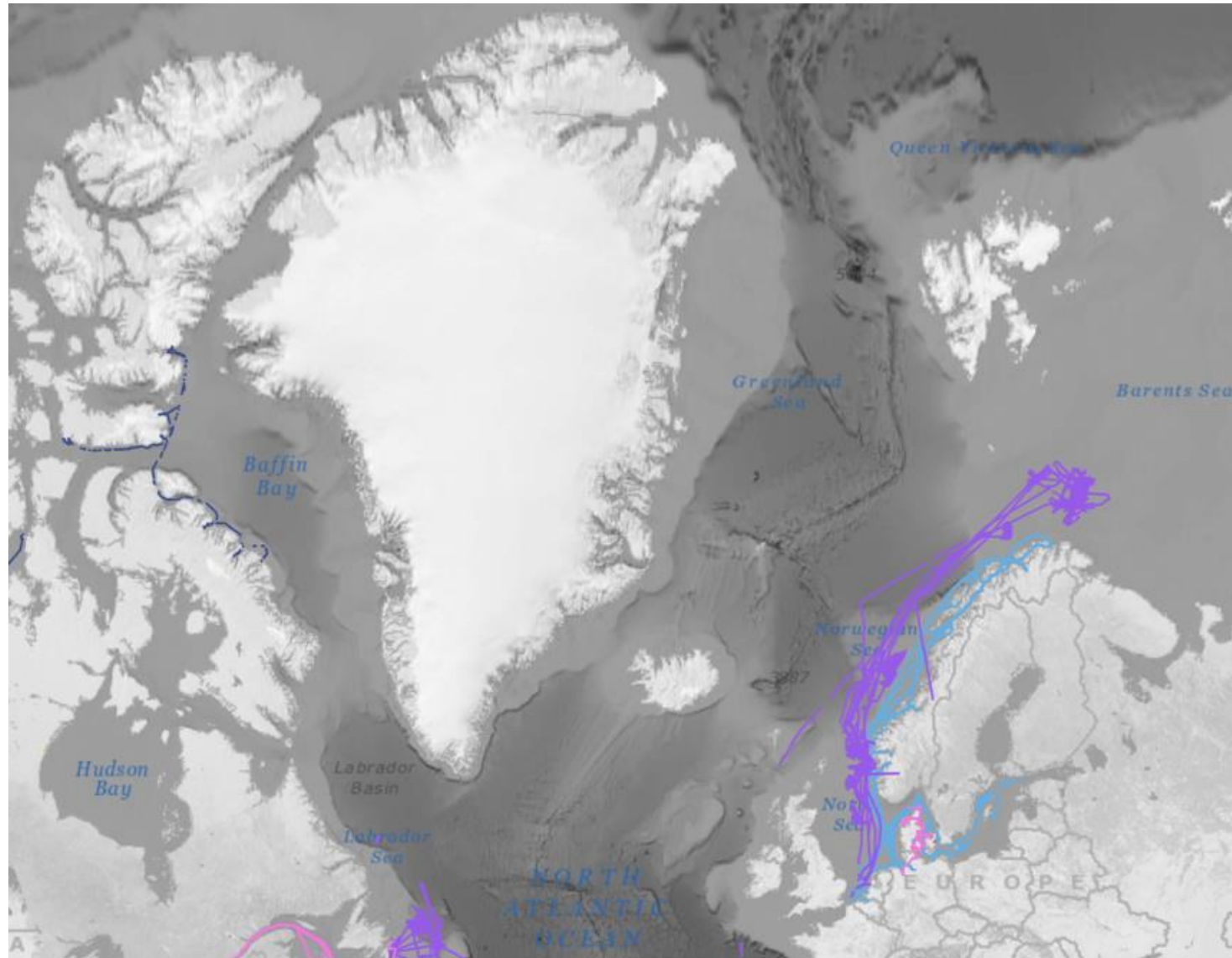




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# CSB Data Holdings - NSHC

International  
Hydrographic  
Organization





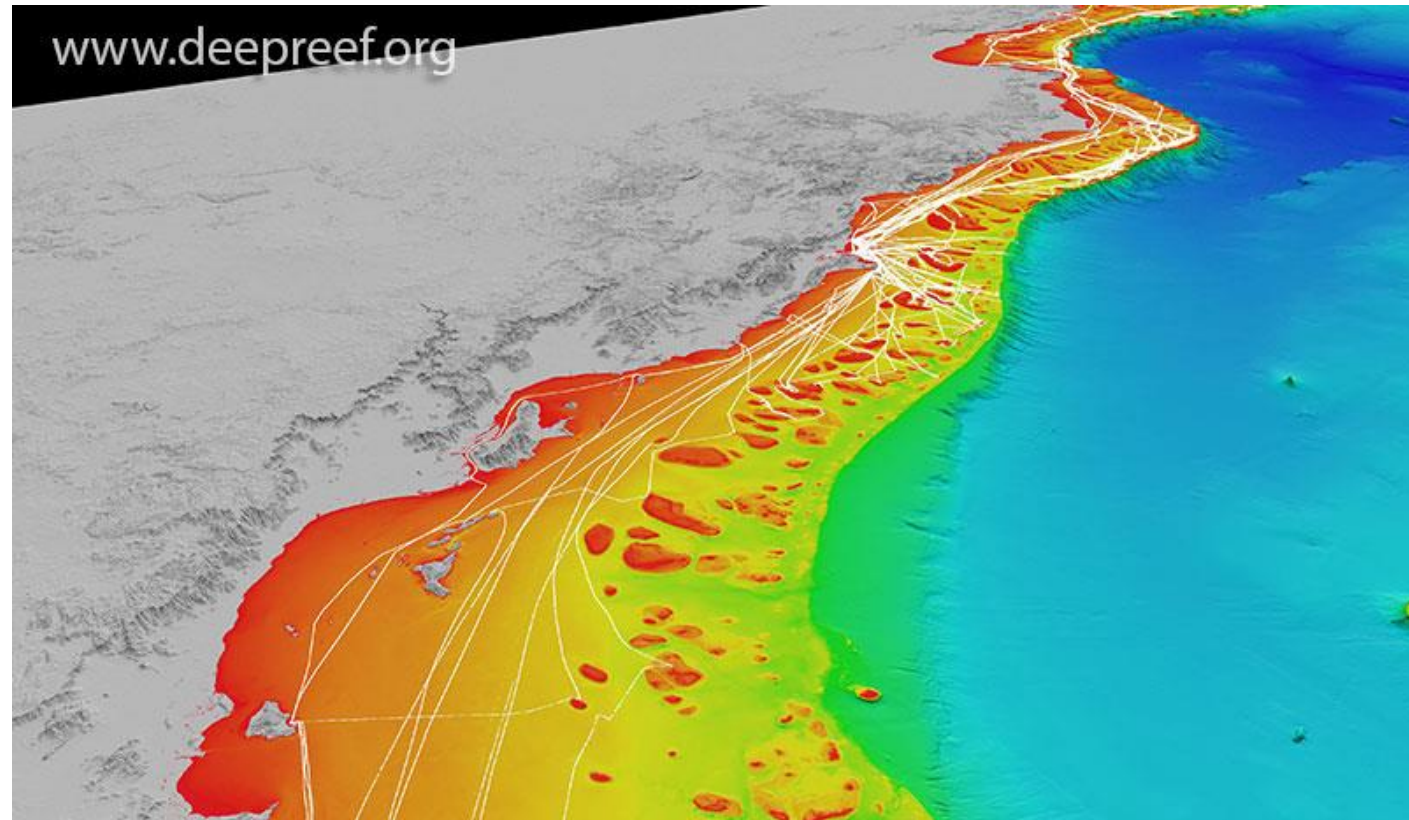


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# The Value of CSB Data

International  
Hydrographic  
Organization

- Data with scientific, commercial & research value at no cost to the public sector
- Fill gaps where data is scarce (eg: Arctic, SIDS)
- Useful along shallow, complex coastlines
- Identify uncharted features
- Assist in verifying charted information
- Confirm whether charts are appropriate for the latest traffic patterns.



*3D view of northern Great Barrier Reef showing all vessel tracks as of December 2019*

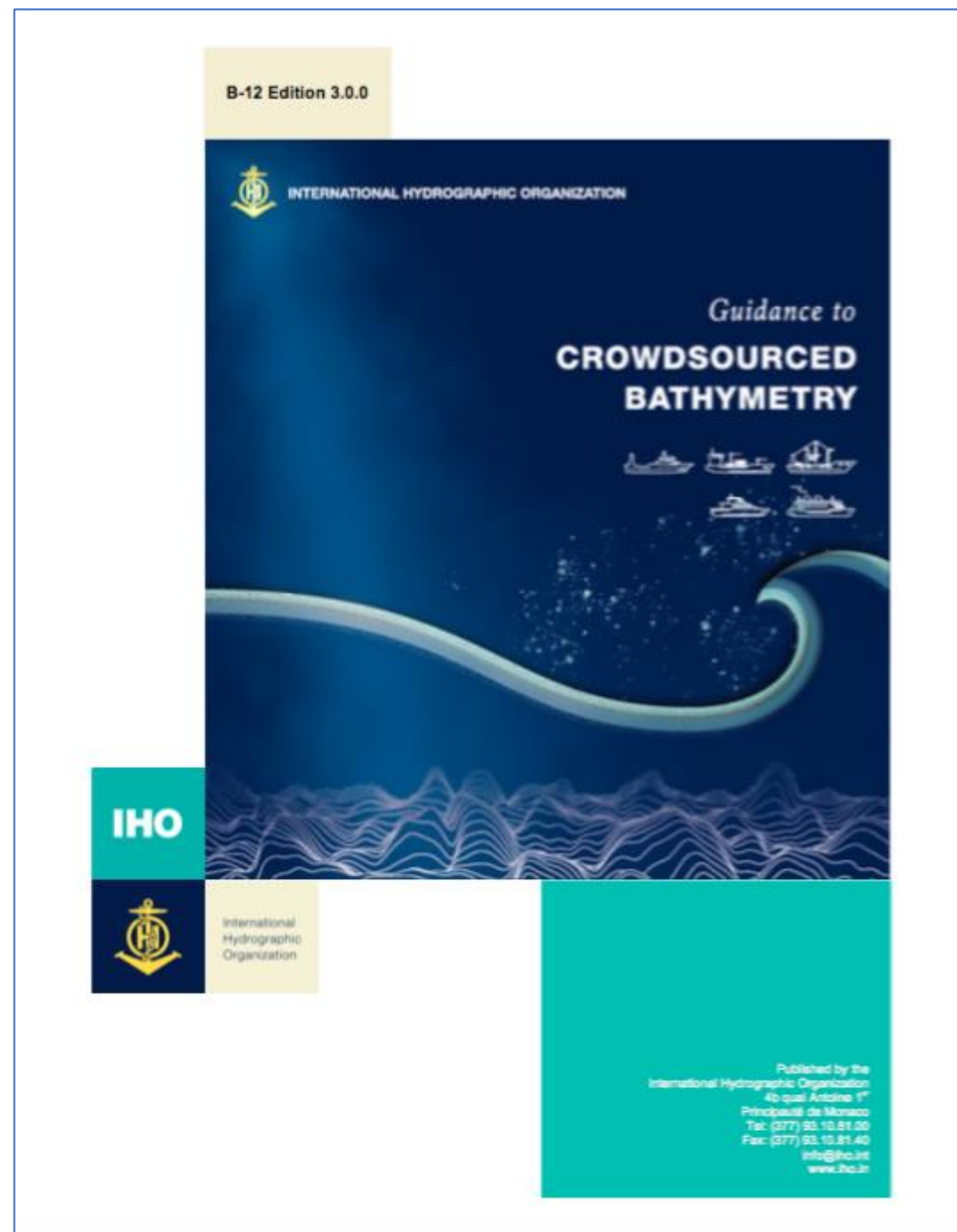


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# How to Collect & Contribute CSB Data

International  
Hydrographic  
Organization

- The DCDB accepts CSB contributions through a network of **"Trusted Nodes"**
  - Eg: organizations, companies or universities serving as data liaisons between mariners (data collectors) and the DCDB.
  - Trusted Nodes may supply data logging equipment, provide technical support to vessels, download data from data loggers, and be responsible for data transfer directly to the DCDB.
- CSB data must be provided in either CSV or GeoJSON, and capture the minimum required information (XYZ, timestamp).





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# Current CSB Trusted Nodes

## Electronic Charting Systems

- Rosepoint, Navico C-MAP, Aquamap

## Hardware Companies

- Orange Force Marine, FarSounder Inc.

## Cruise Line

- Carnival utilizing MacGregor-Germany's Voyage Data Recorders (VDR)

## Marine Contractors

- PGS, M2Ocean

## Academia

- James Cook Uni along the Great Barrier Reef

## Non Profit

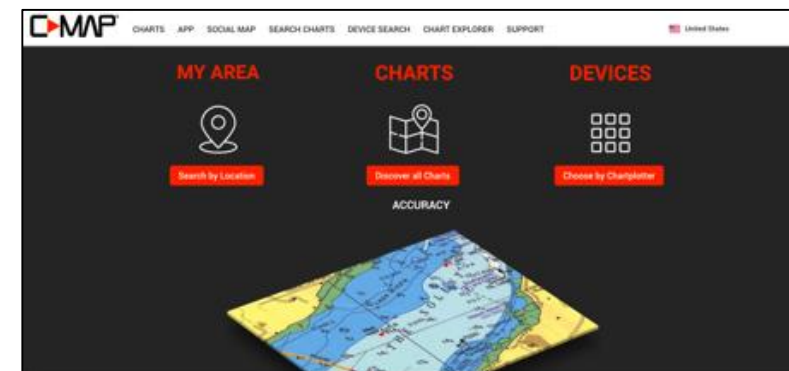
- Great Lakes Observing System (GLOS), Interdisciplinary Center for Development in Ocean Mapping (CIDCO)



[www.rosepointnav.com](http://www.rosepointnav.com)



Voyage Data Recorder



SmartLog USB data logger





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# CSB Trusted Nodes – Seabed 2030 Project

International  
Hydrographic  
Organization

## Objective:

1. Facilitate field trials that will accelerate CSB activity
2. Collect data in data scarce areas
3. Grow excitement about the CSB initiative!

## In return, a potential program must guarantee the provision of staff to:

1. Hand out data loggers to the community
2. Assist local mariners in set up
3. Provide a copy of these data to Seabed 2030 for inclusion into the DCDB and the GEBCO grid



**Support includes provision of data loggers (NMEA0183 and NMEA2000) and installation support (where needed).**



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# CSB Trusted Nodes – Seabed 2030-funded CSB Programs

International  
Hydrographic  
Organization

## The Institute For Maritime Technology & The South African Navy HO

- 100 data loggers deployed to SANHO/IMT.
- Planning of trials: identification of stakeholders, establish relationships, feasibility studies, regular communication via various channels.



*“Sea Lab 1”, IMT – trial deployment (Credit: CDR Christoff Theunissen)*



## Bureau of Marine Transportation - Palau

- 100 data loggers received (NMEA0183 and NMEA2000)
- Coordinating with South & West Pacific Seabed 2030 Data Center
- Currently receiving support from U.S. Navy for logger installation and setup.





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# CSB Trusted Nodes – Seabed 2030-funded CSB Programs

International  
Hydrographic

## Greenland Institute of Natural Resources, Nuuk

- Main challenges: remoteness of area and engaging local communities.
- Phase 1: aim to engage approximately 50 vessels of various sizes- 30 data loggers deployed so far.
- Engagement and outreach: identification of participants, visits to communities, regular communication via various channels.
- Deliverables: contributions to future versions of IBCAO and GEBCO grids, sharing of safety and navigation knowledge, research papers, educational material.
- Feedback: fun, engaging, interesting!



*Credit: Karl Zinglensen*

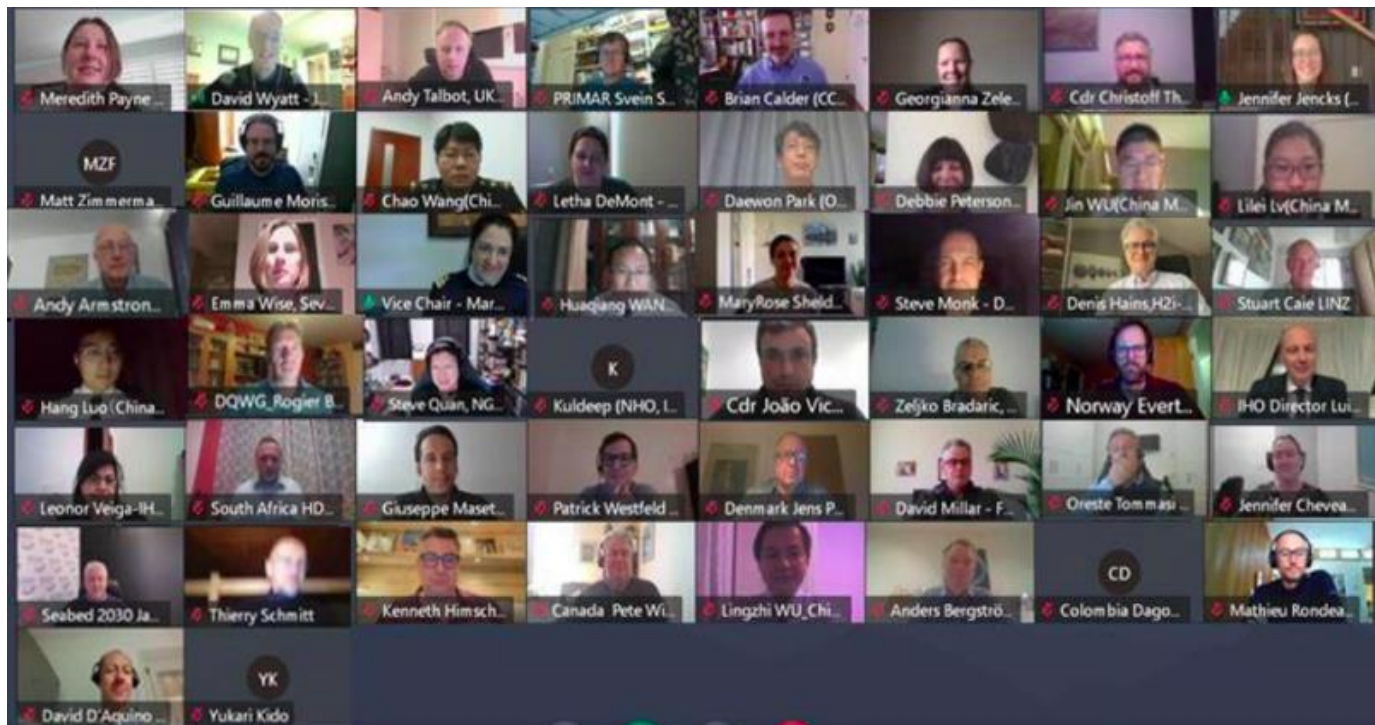


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# IHO CSB Working Group

International  
Hydrographic  
Organization

- **Meetings:** 13 meetings, 1 industry workshop
- **Chair:** Jennifer Jencks, USA; **Vice Chair:** Peter Wills, Canada
- **Representatives from 18 Member States:** Canada, China, **Denmark**, France, Germany, India, Italy, Lebanon, Mexico, Netherlands, New Zealand, **Norway**, Portugal, South Africa, **Sweden**, UK, Uruguay, USA
- **IHO Secretariat:** IHO Assistant Director Sam Harper, IHO Director Luigi Sinapi



- **Observers and expert contributors:** CCOM-JHC, CIDCO, CIRES, Da Gamma Maritime Ltd, Dongseo U, Dock Tech, ECC AS, ESRI, FarSounder, FLIR Systems AB, Fugro, GMATEK, Inc., H2i, James Cook U, JAMSTEC, Navico/C-Map, ONE Data Tech Co., Olex, Orange Force Marine, PYA, Seabed 2030, Sea-ID, SevenCs/ChartWorld, TeamSurv, Teledyne CARIS, World Maritime University, and World Ocean Council

**CSBWG14 Meeting: August 2023, Stavanger, Norway**

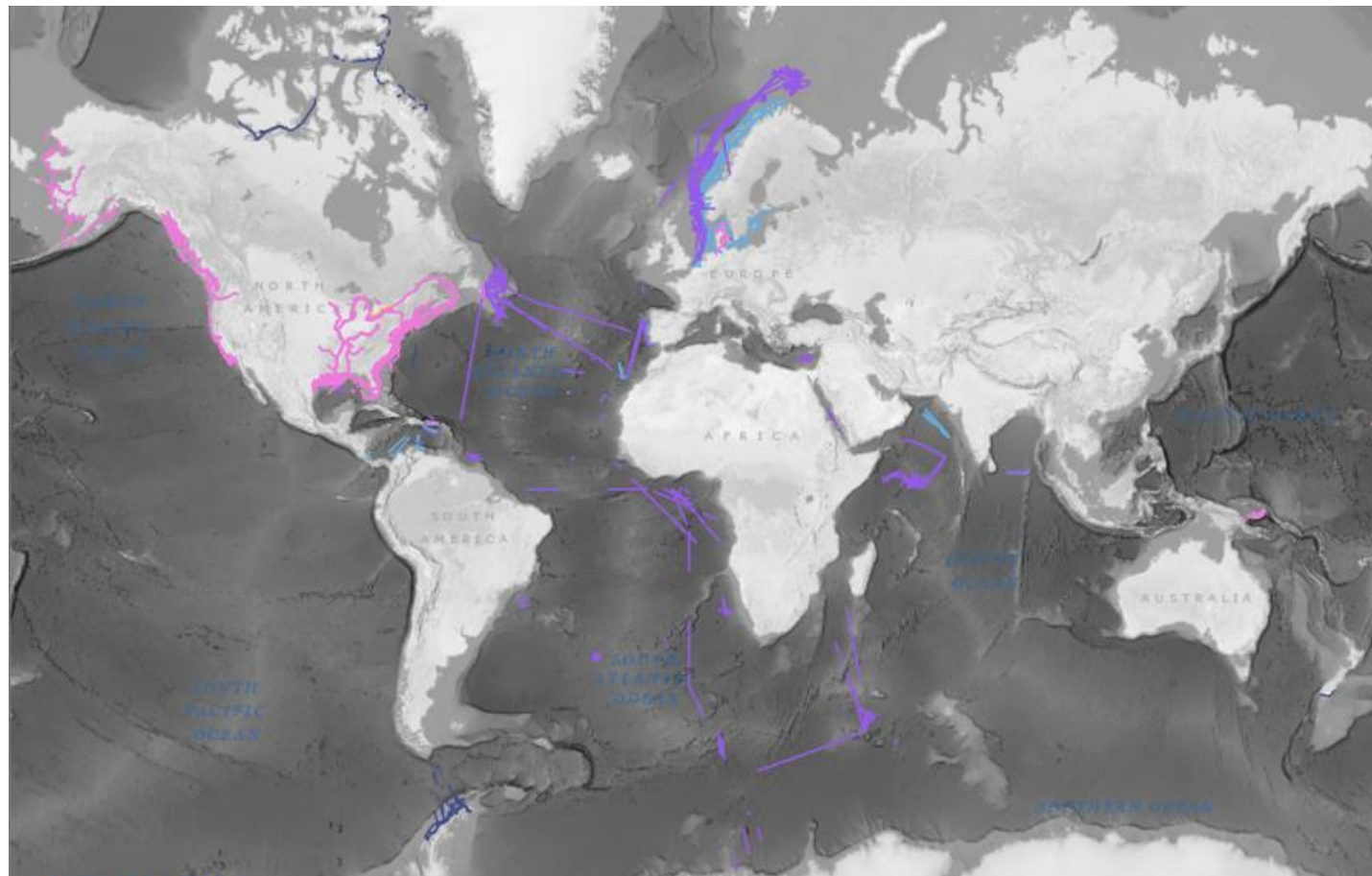


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# How can your HO become involved?

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Hydrographic  
Organization

- ***Consider joining and/or attending the CSBWG - it is open to all!***
- Discuss CSB data at this meeting







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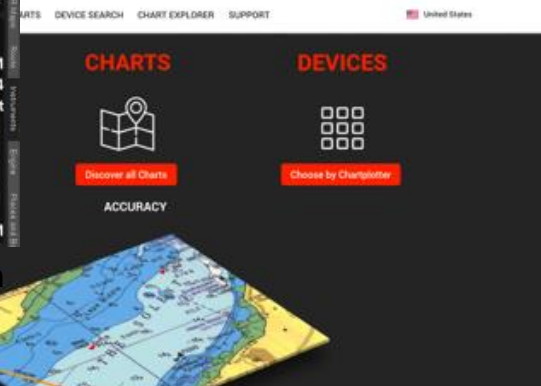
# How can your HO become involved?

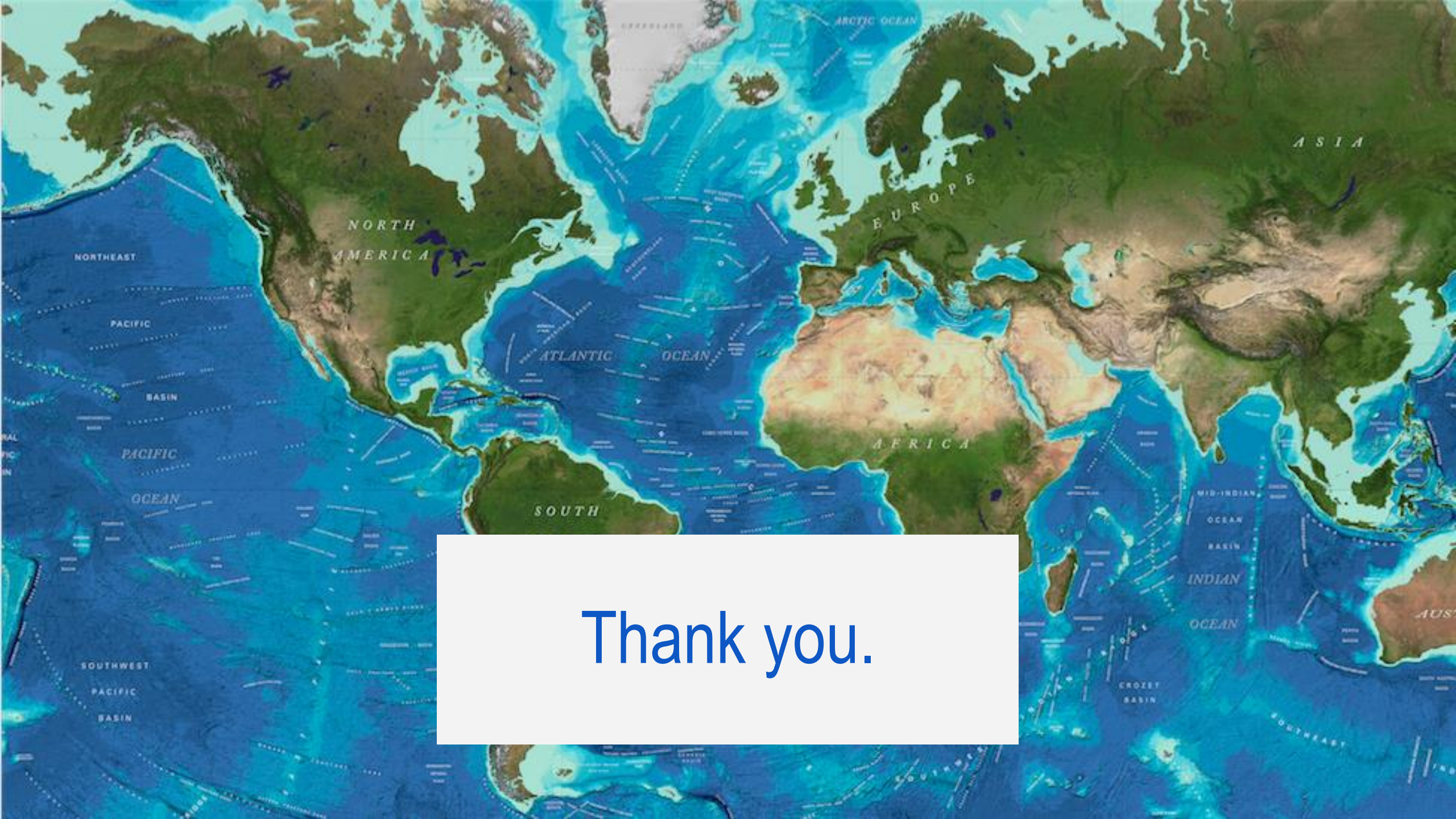
International  
Hydrographic  
Organization

- Determine local interest in participating.
- Determine how your community can become involved. Options include:
  - Utilizing participating navigation software systems
  - Utilizing VDRs for larger seagoing vessels
  - Installation of data loggers
    - Consider identifying funding opportunities for logger purchases and distributions
    - Requesting support from Seabed 2030

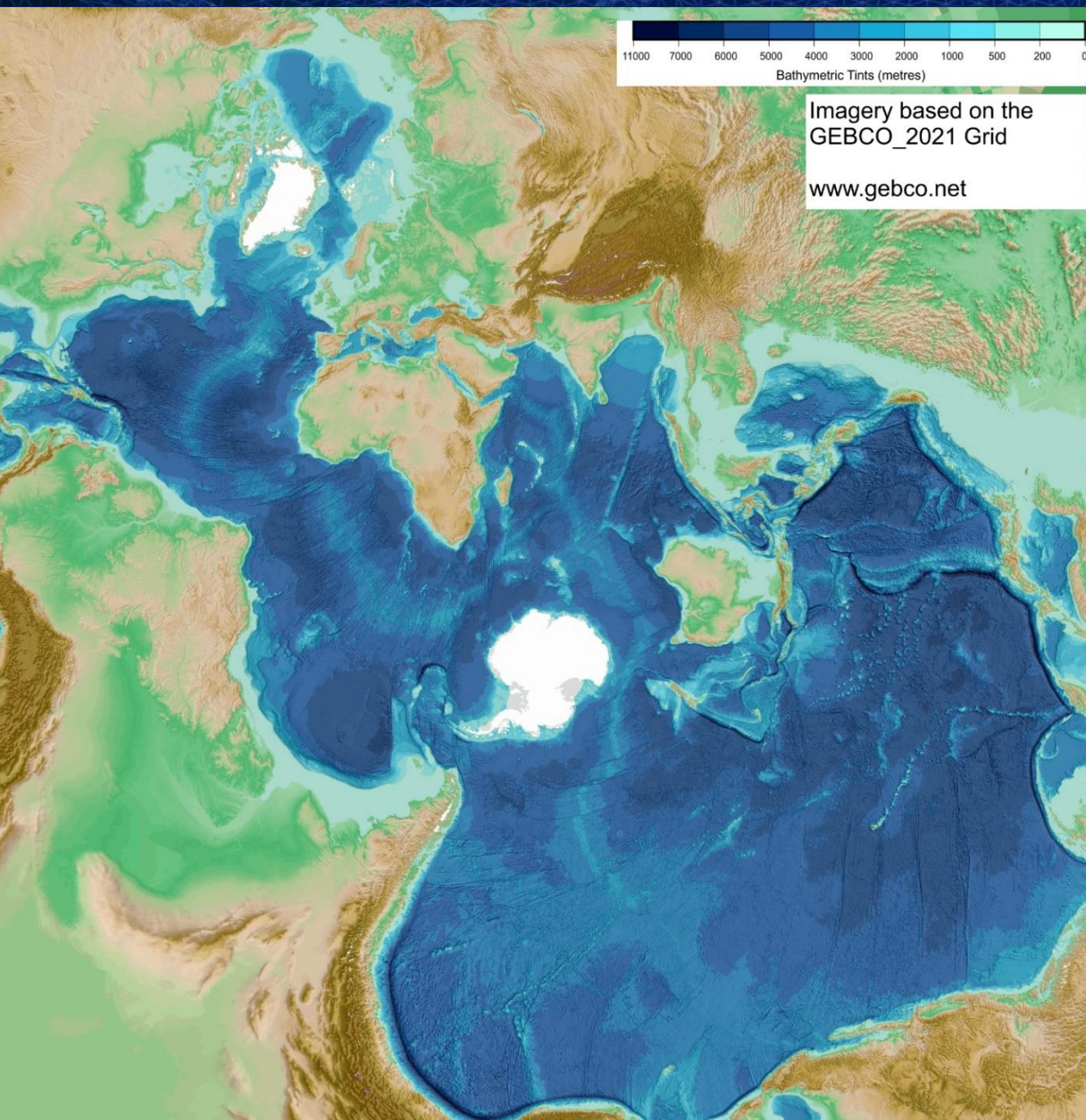


SmartLog USB data logger





Thank you.



# GEBCO, the foundation of the Digital Twin of the Ocean