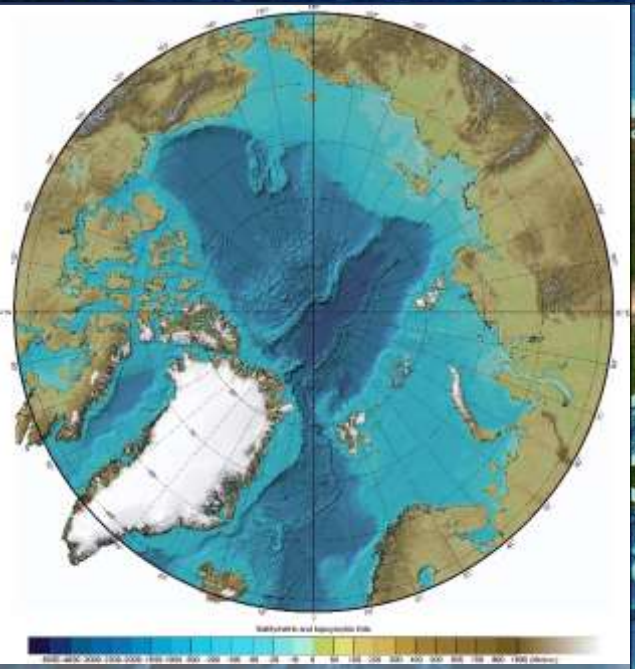
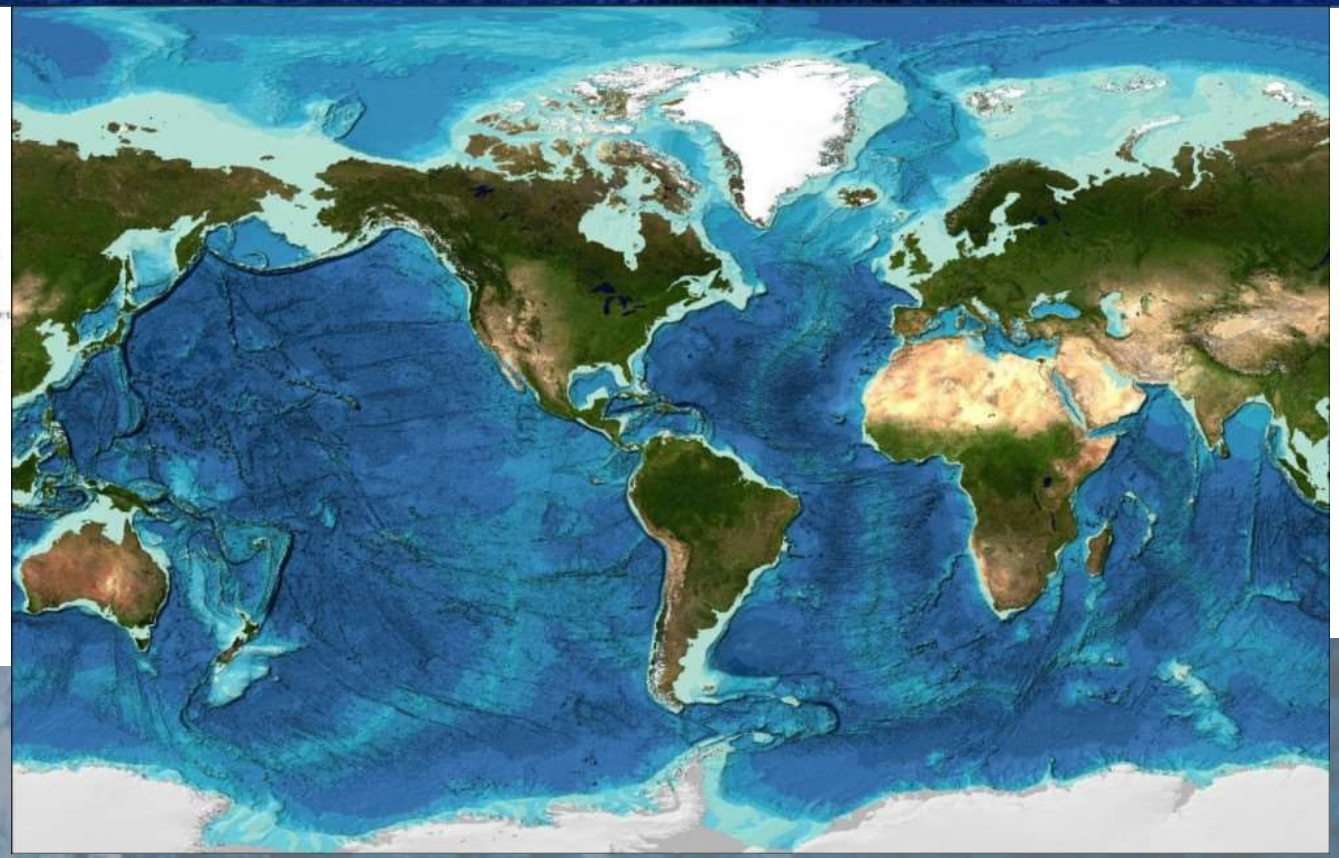
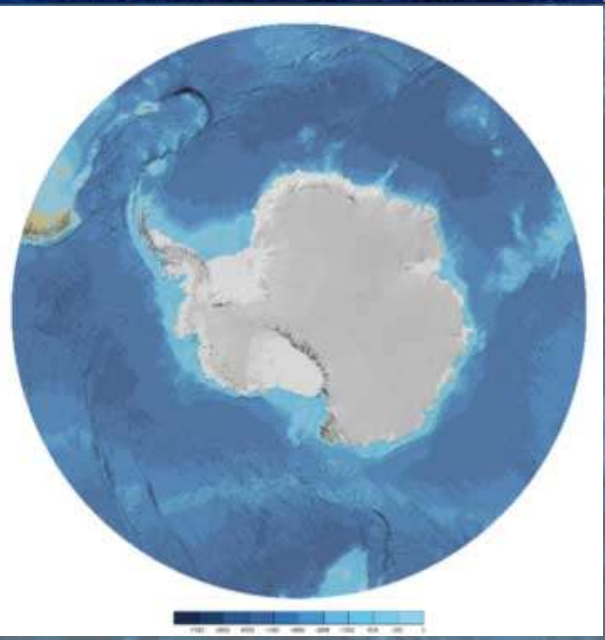
GEBCO



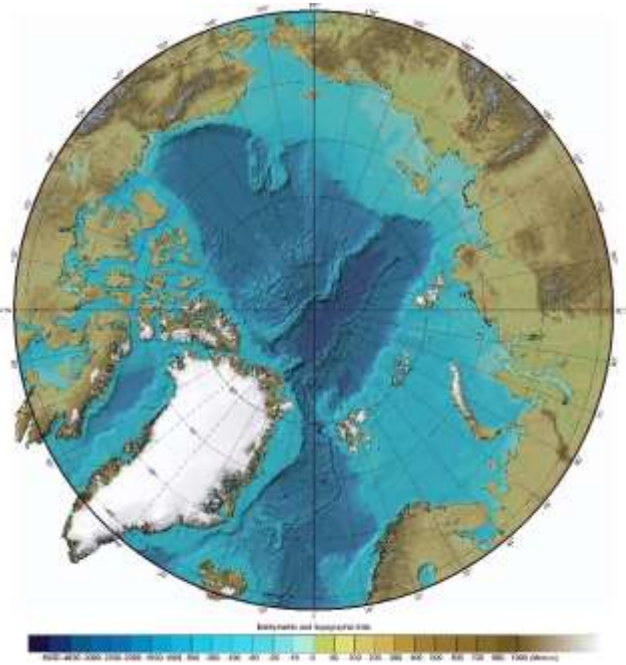


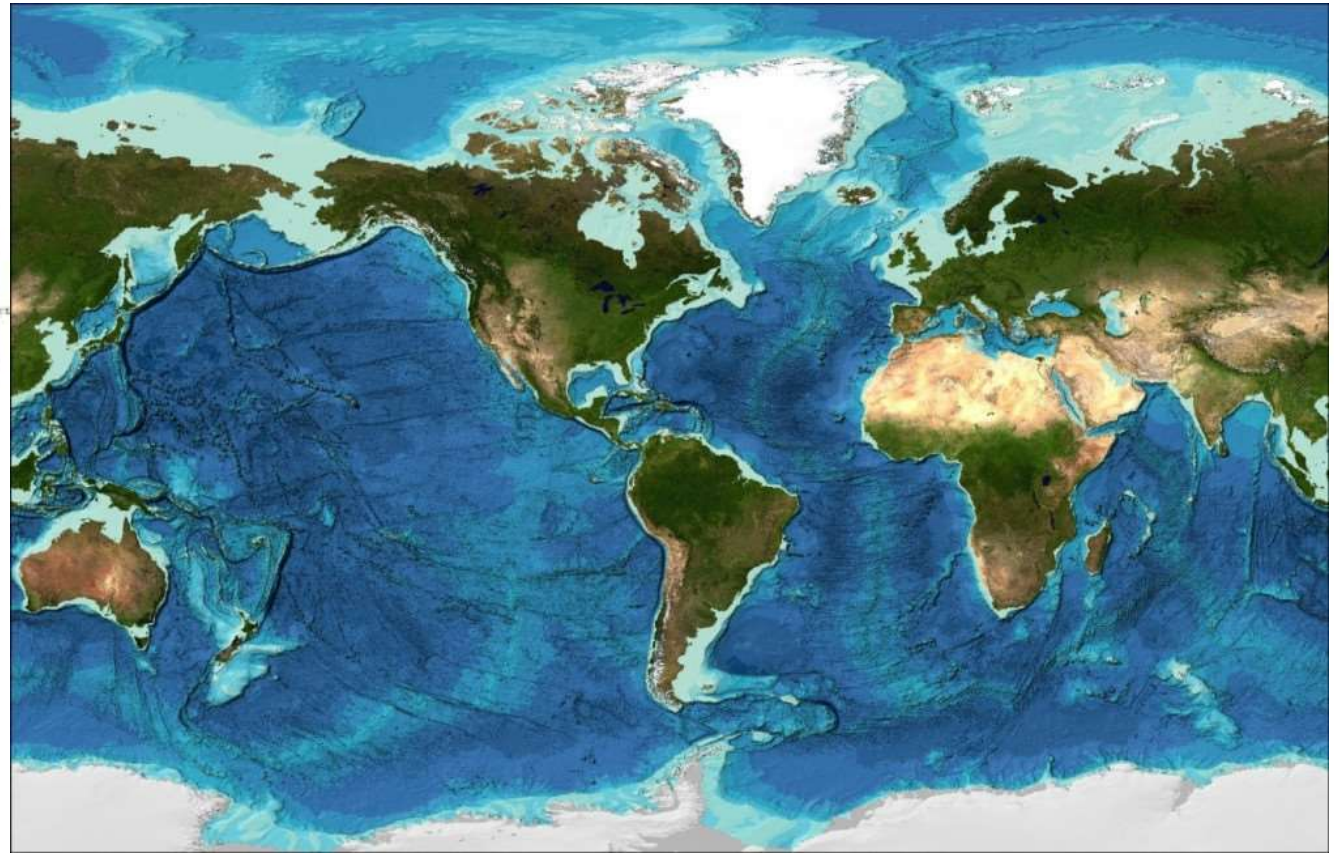


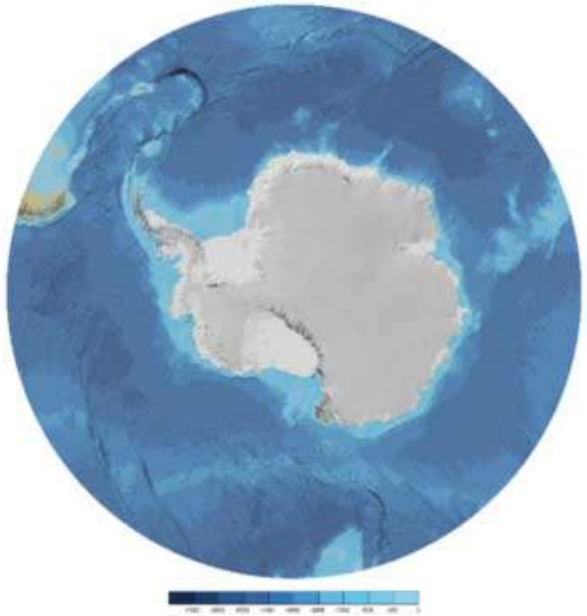
The last great mapping endeavor of our planet

NSHC36-D8
Evert Flier

GEBCO, building partnerships for ocean mapping







IHO International Hydrographic Organization

UNESCO United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

General Bathymetric Chart of the Oceans

GEBCO

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

International Hydrographic Organization

Organisation Hydrographique Internationale

IHO

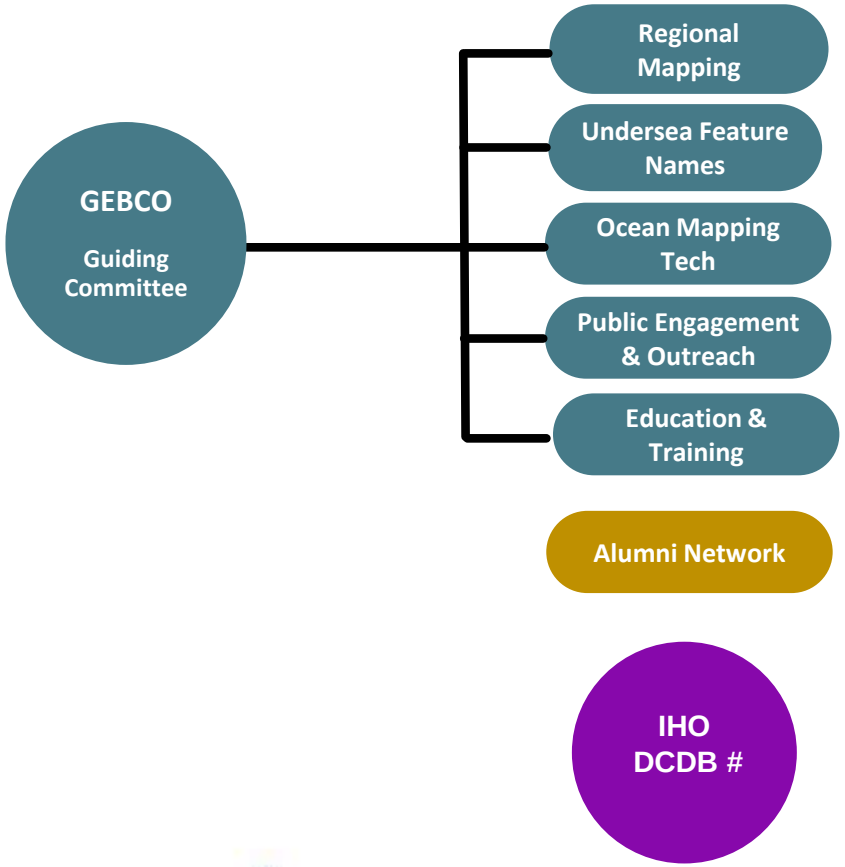
UNESCO

Intergovernmental Oceanographic Commission

120 years

GEBCO


IHO
International Hydrographic Organization
unesco
Intergovernmental Oceanographic Commission
General Bathymetric Chart of the Oceans
GEBCO
GEBCO Guiding Committee


GEBCO
Guiding Committee
Regional Mapping
Undersea Feature Names
Ocean Mapping Tech
Public Engagement & Outreach
Education & Training
Alumni Network
IHO DCDB #

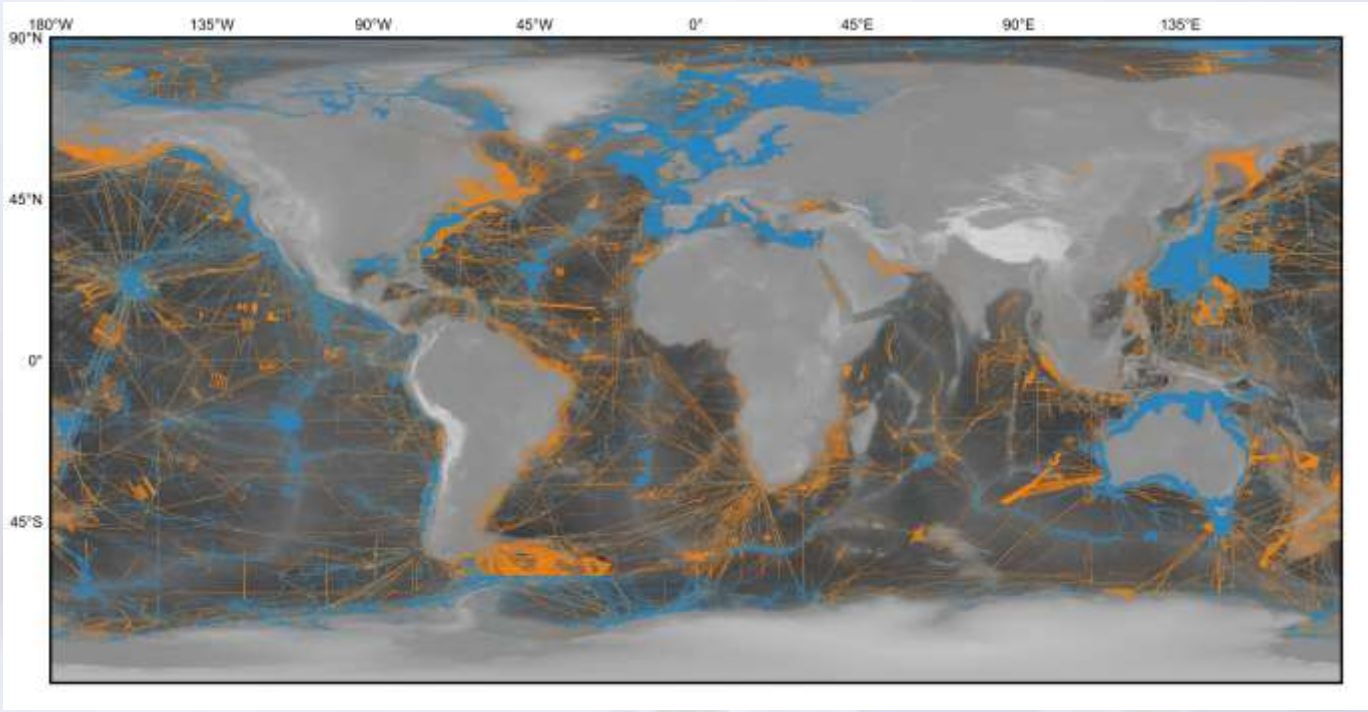
GEBCO-SB2030-CSB developments

- 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

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%**



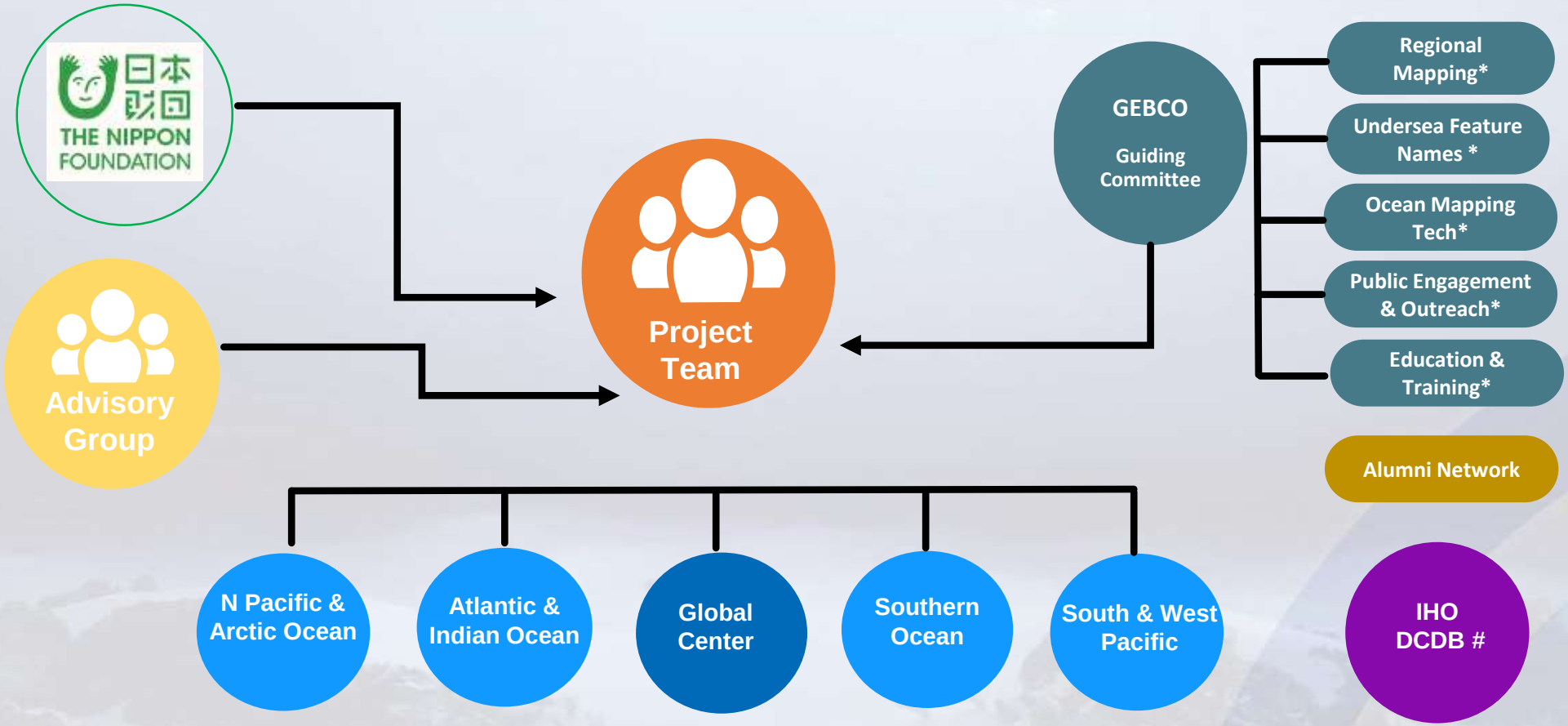
GEBCO 2014

Data additions to 2021

Courtesy: Martin Jakobsson, SU

THE NIPPON FOUNDATION-GEBCO SEABED 2030

Seabed 2030 Network



4 “Regional Centers” + 1 “Global Center”

(* GEBCO Sub Committees)

(# Data Centre for Digital Bathymetry)

THE NIPPON FOUNDATION-GEBCO

SEABED 2030

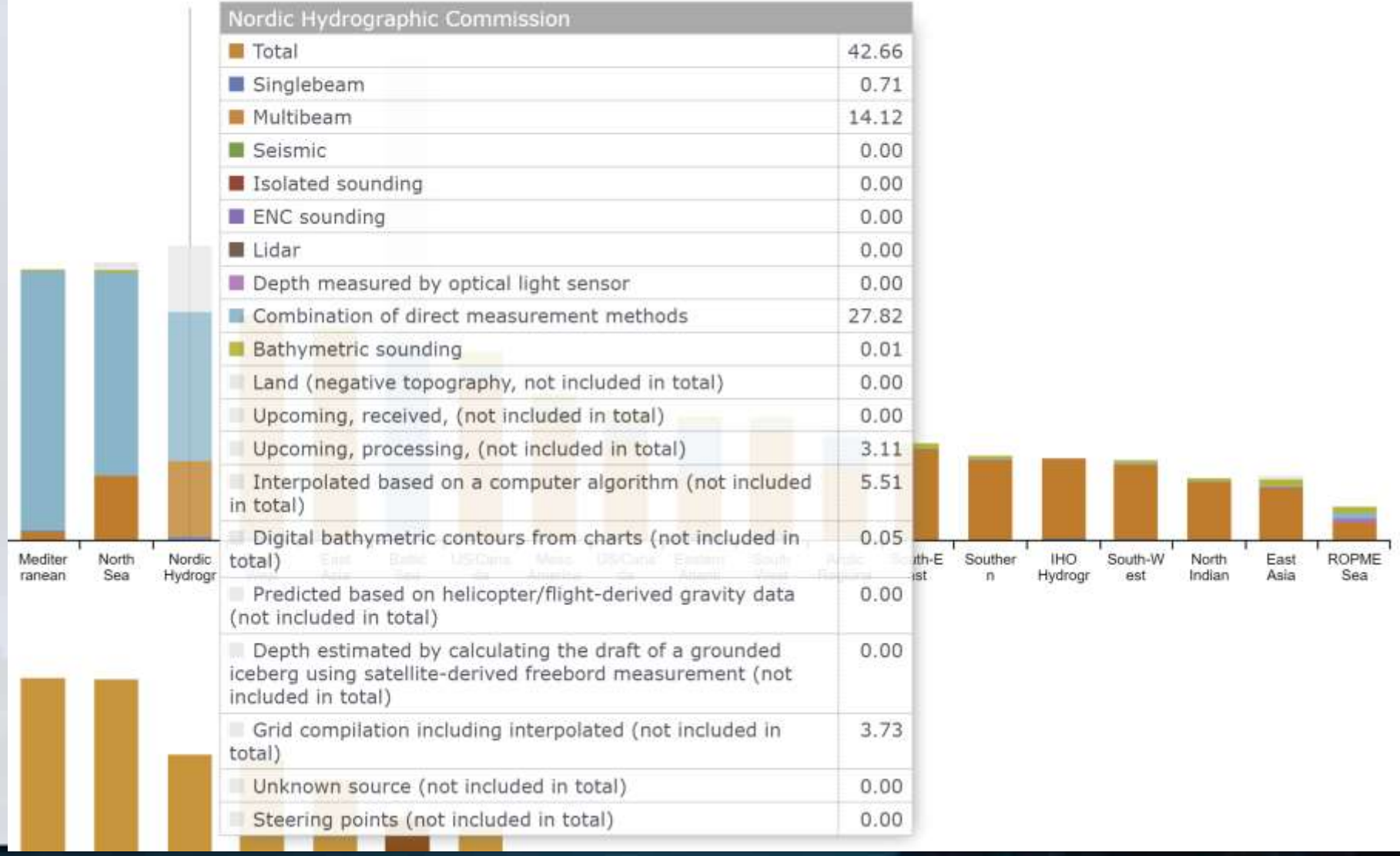
Update for Project Year 6
Q1 and Q2 (Aug 22 - Jan 23)

Jamie McMichael-Phillips
Project Director

10 February 2023

THE NIPPON FOUNDATION | General Bathymetric Chart of the Oceans GEBCO | IHO International Hydrographic Organization | unesco Intergovernmental Oceanographic Commission | 2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Regional hydrographic commissions



Nordic Hydrographic Commission	
Total	42.66
Singlebeam	0.71
Multibeam	14.12
Seismic	0.00
Isolated sounding	0.00
ENC sounding	0.00
Lidar	0.00
Depth measured by optical light sensor	0.00
Combination of direct measurement methods	27.82
Bathymetric sounding	0.01
Land (negative topography, not included in total)	0.00
Upcoming, received, (not included in total)	0.00
Upcoming, processing, (not included in total)	3.11
Interpolated based on a computer algorithm (not included in total)	5.51
Digital bathymetric contours from charts (not included in total)	0.05
Predicted based on helicopter/flight-derived gravity data (not included in total)	0.00
Depth estimated by calculating the draft of a grounded iceberg using satellite-derived freebord measurement (not included in total)	0.00
Grid compilation including interpolated (not included in total)	3.73
Unknown source (not included in total)	0.00
Steering points (not included in total)	0.00

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.

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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.*

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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.*

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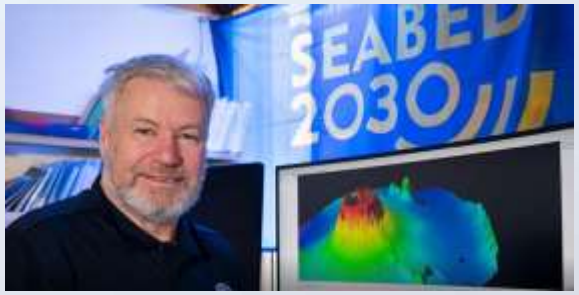
WP4 – Mapping Activities



- 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.

EOMAP
detect more.

- Ongoing engagement across IHO Regional Commissions.

THE NIPPON FOUNDATION-GEBCO
SEABED 2030

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 10th World Ocean Summit & Expo (Feb)
  - Our Ocean 2023 (Mar)
  - UK Centre for Seabed Mapping Showcase (Mar)

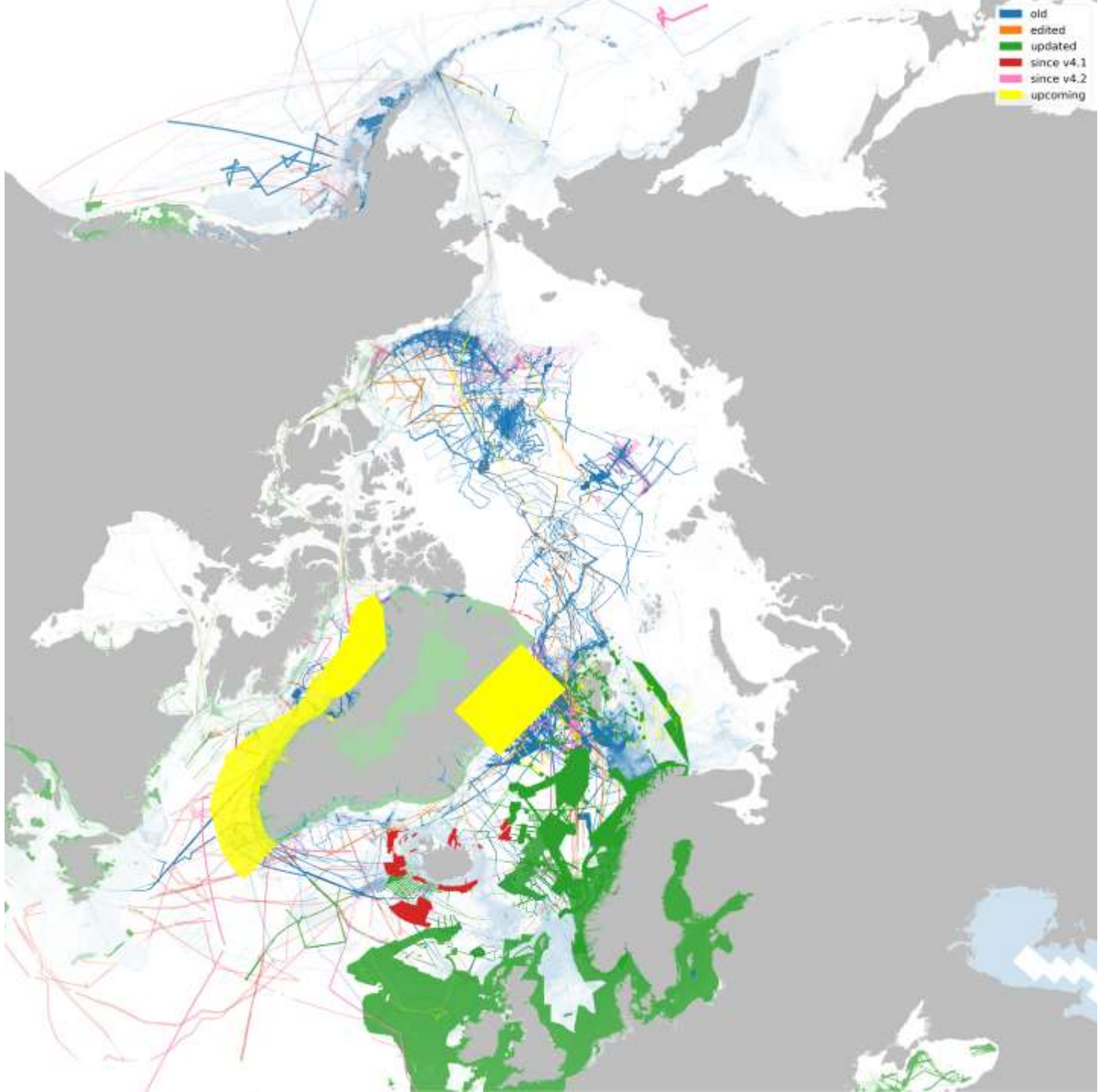
- Looking ahead to Y6 End (Jul 23)
  - US Hydro 2023 Conference (Mar)
  - IHO-Yacht Club of Monaco CSB Event (Mar)
  - Ocean Business (Apr)
  - Geospatial World Forum (May)
  - IHO Assembly (May)
  - ARTofMELT 2023 Expedition (May)
  - Benelux Hydrographic Society Seminar (May)
  - Oceans 2023 (Jun)
  - NF-GEBCO Alumni Conference (Jul/Aug)

THE NIPPON FOUNDATION-GEBCO SEABED 2030

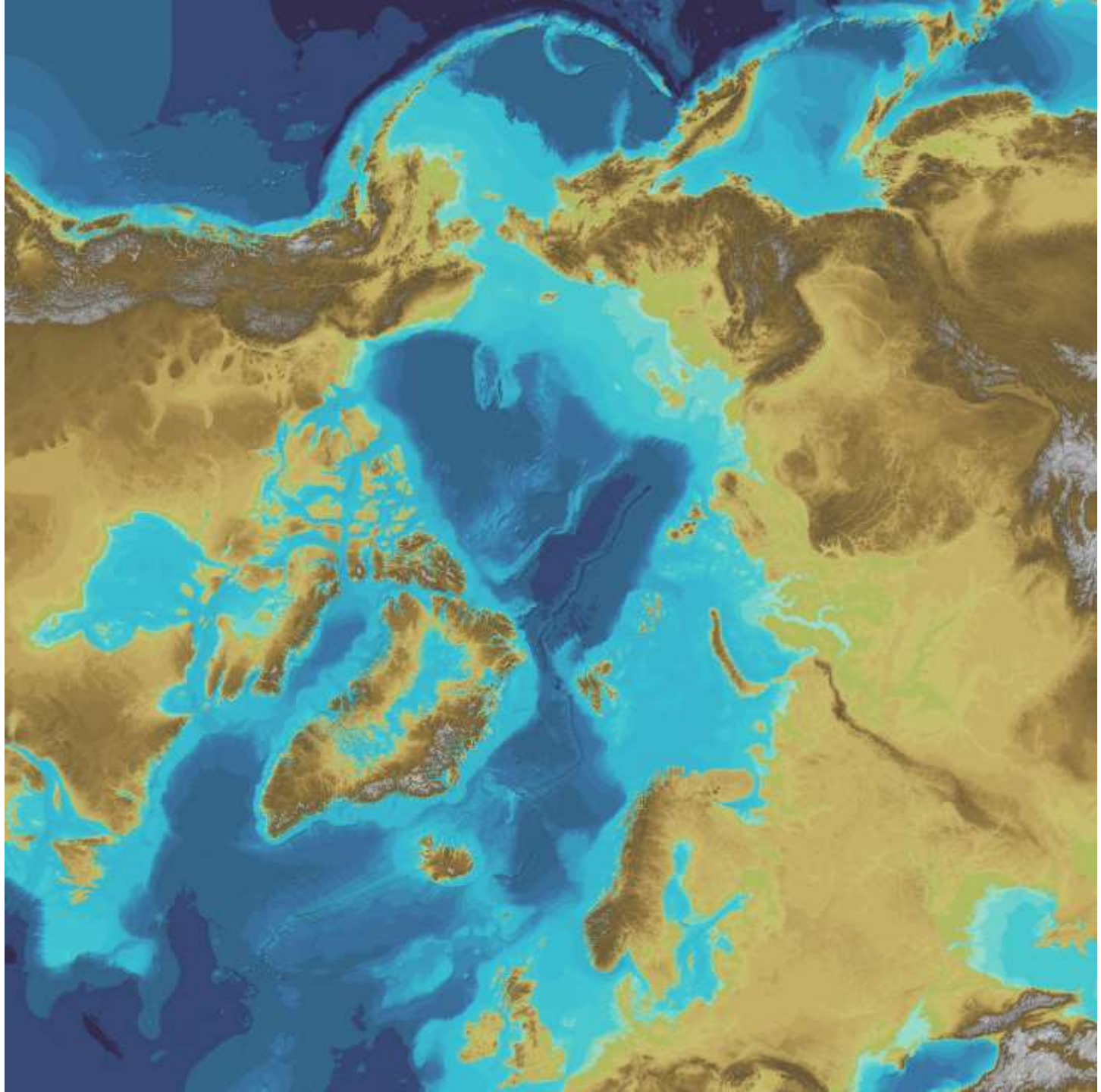
IBCAO data sources (13 March 2023)

(*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

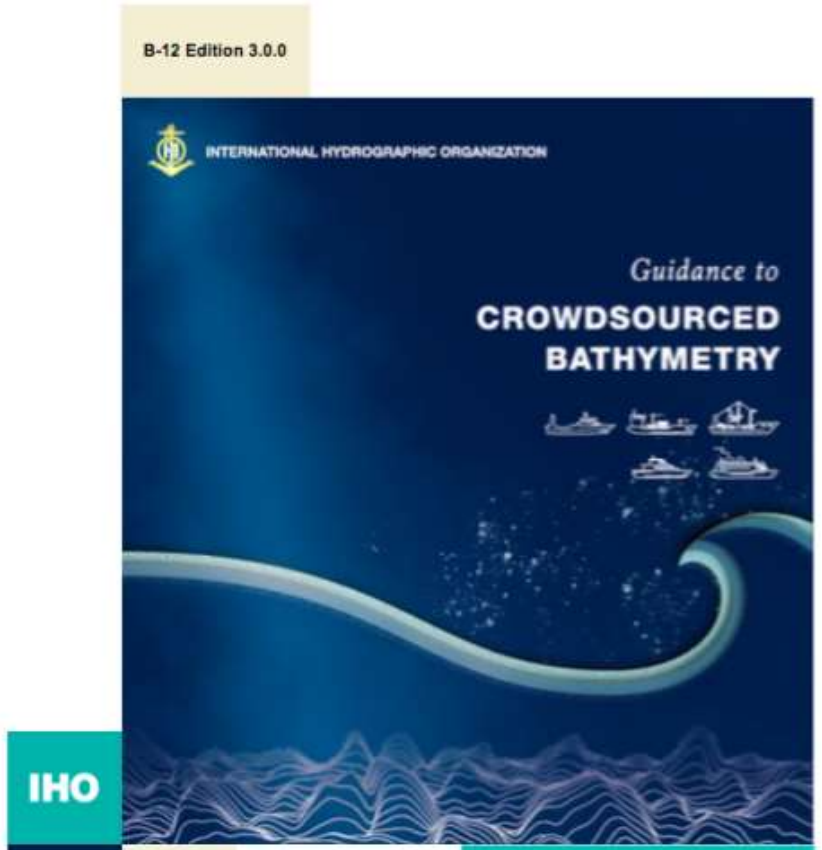
The IHO Crowdsourced Bathymetry Initiative

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



IHO CL 01/2020

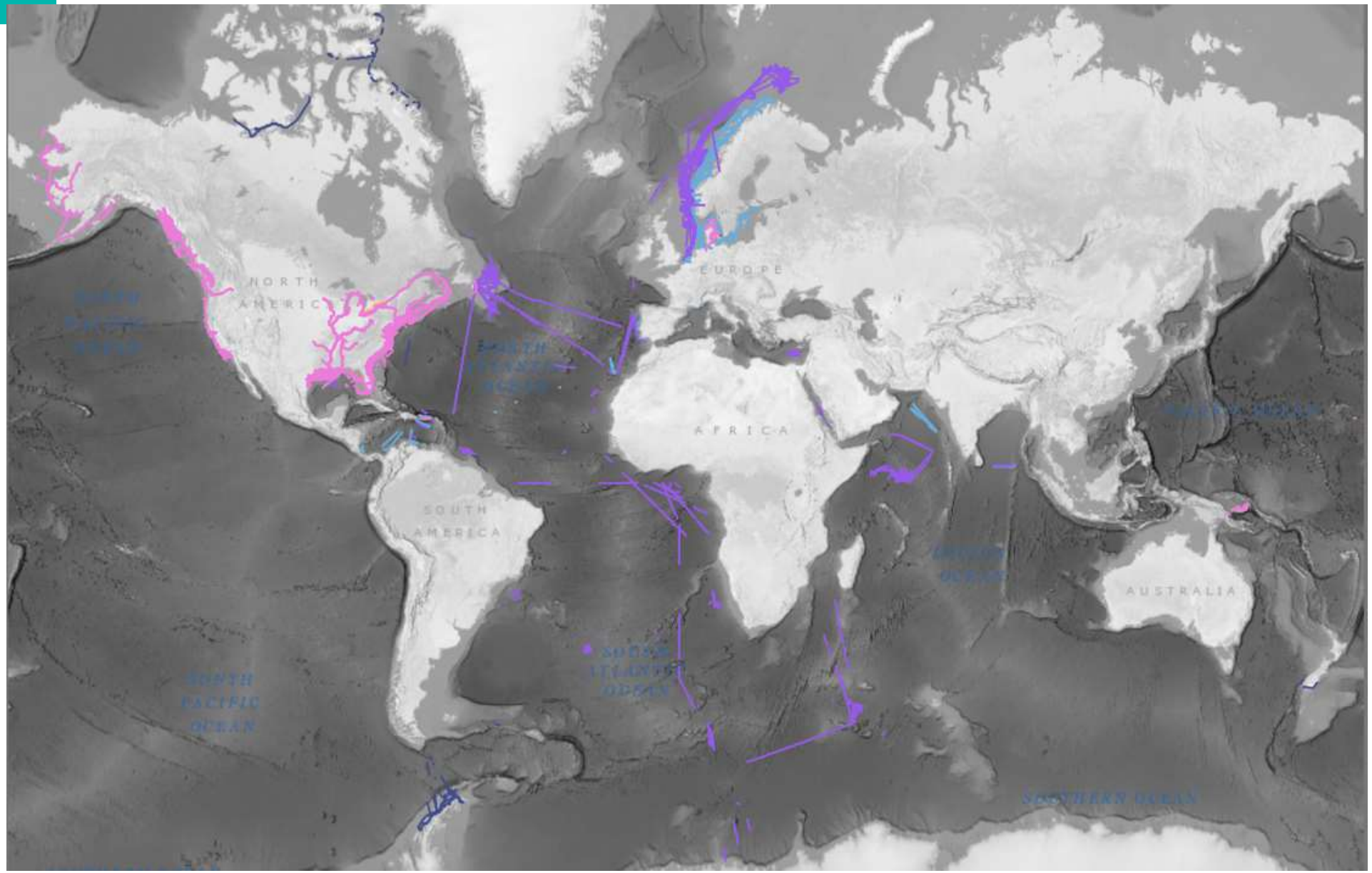
International Hydrographic Organization

- 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***

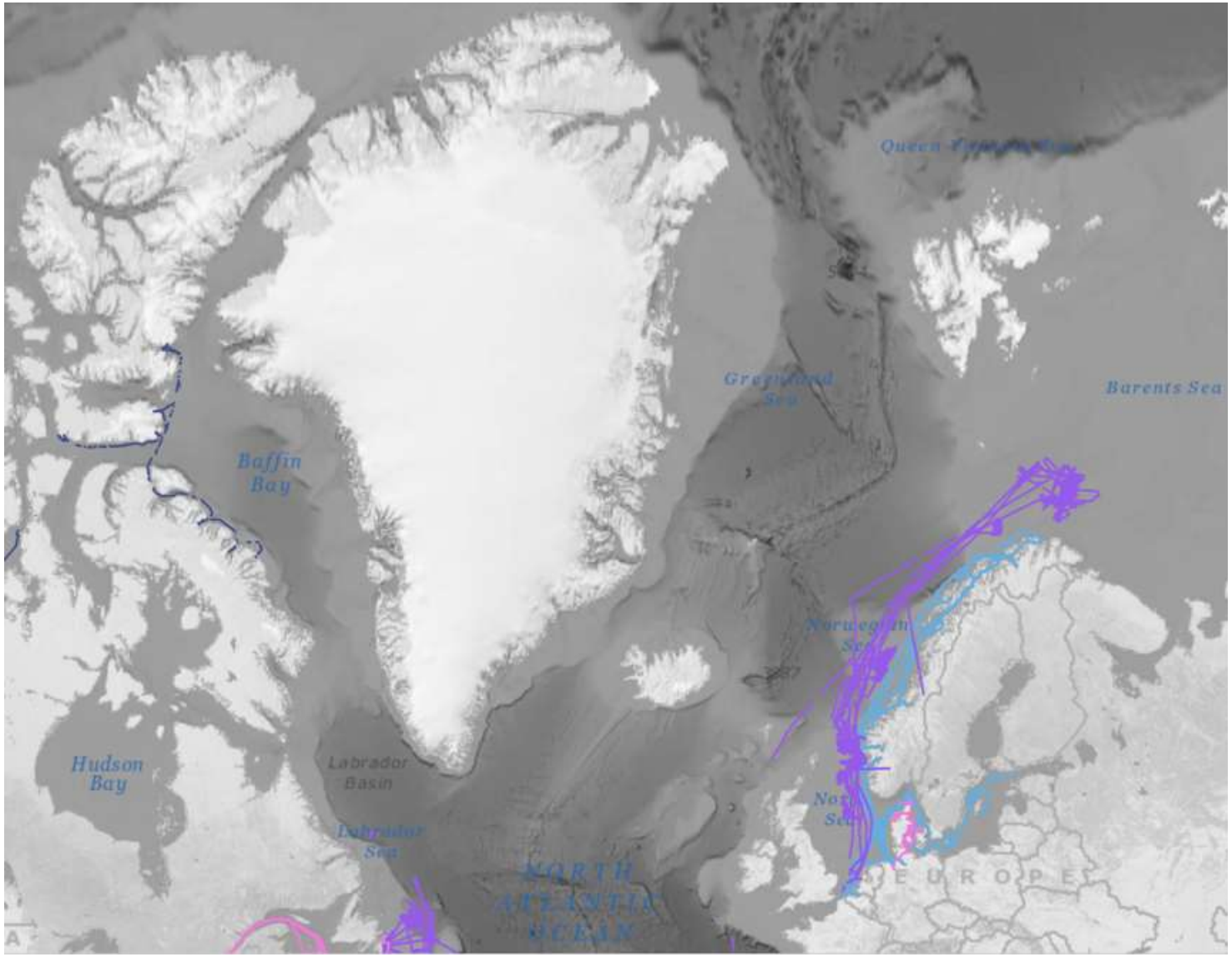
IHO

International Hydrographic Organization

CSB Data Holdings



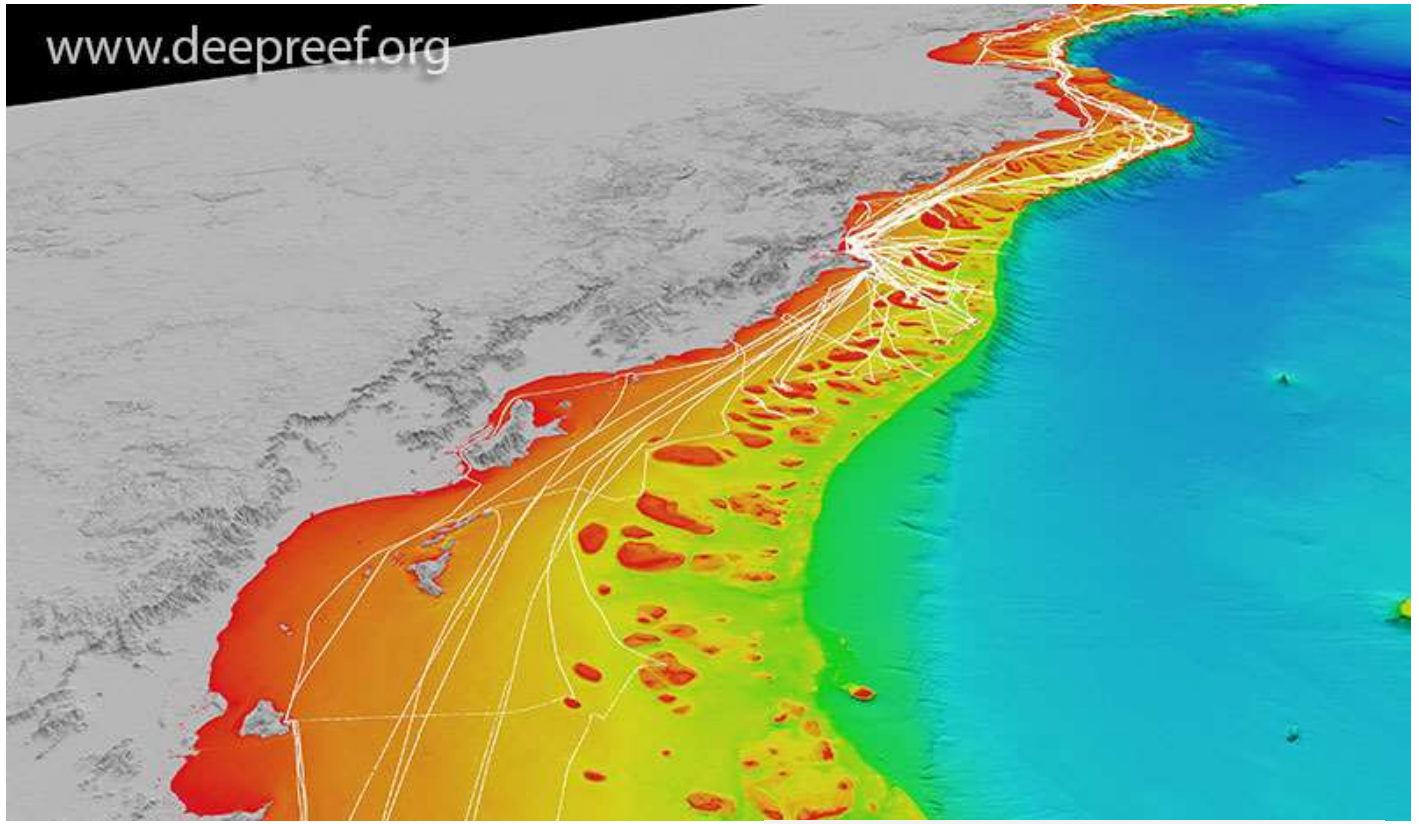
CSB Data Holdings - NSHC



The Value of CSB Data

International Hydrographic Organization

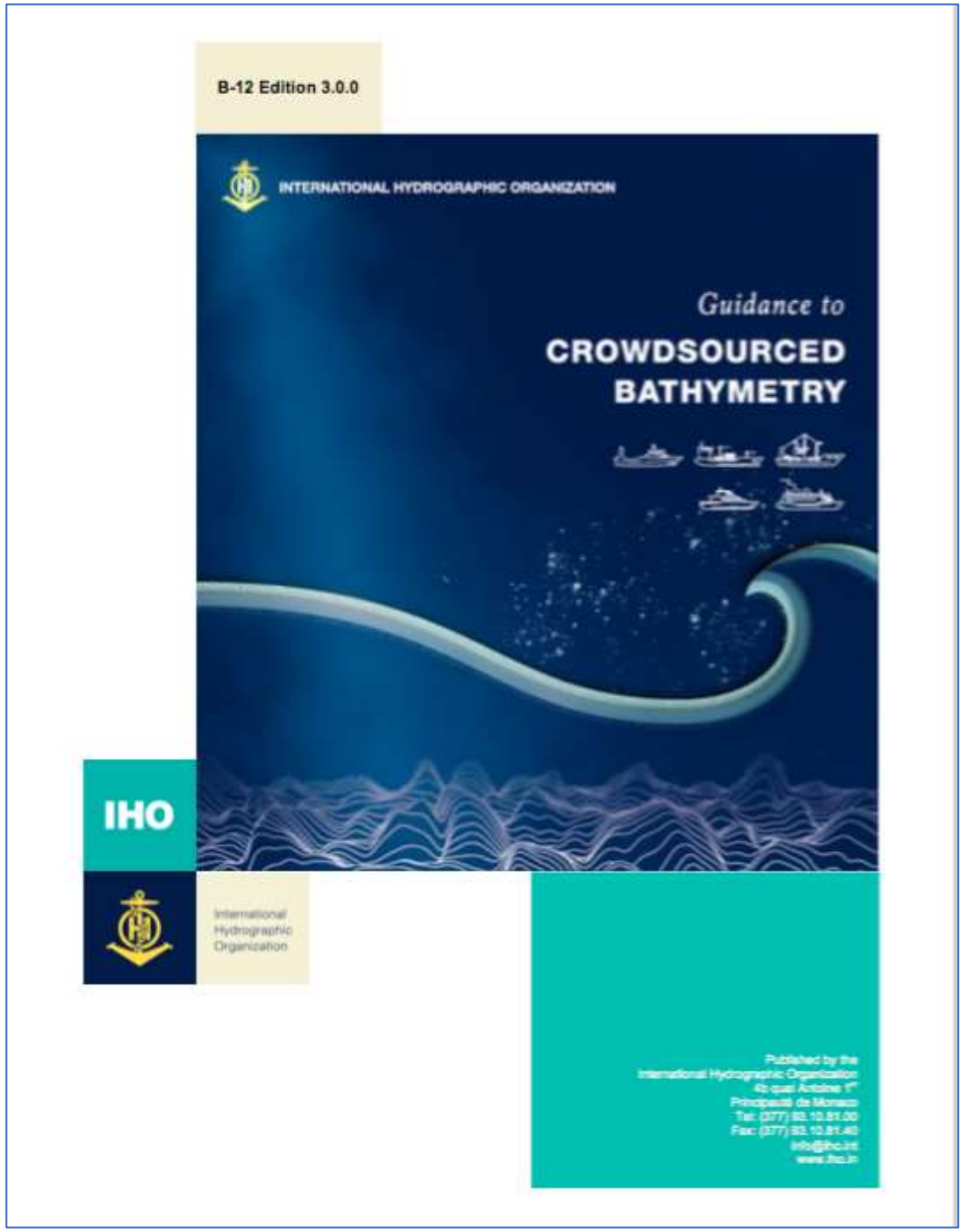
- Data with scientific, commercial & research value at no cost to the public sector
- Fill gaps where data is scarce (eg: Arctic, SIDS)
- Useful along shallow, complex coastlines
- Identify uncharted features
- Assist in verifying charted information
- Confirm whether charts are appropriate for the latest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



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

How to Collect & Contribute CSB Data

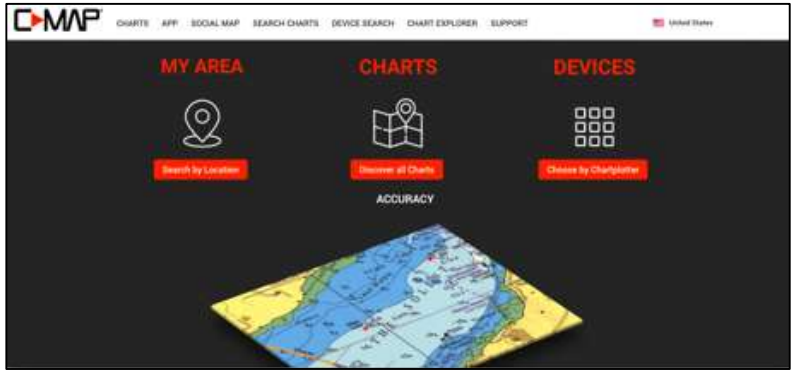
- The DCDB accepts CSB contributions through a network of "**Trusted Nodes**"
  - Eg: organizations, companies or universities serving as data liaisons between mariners (data collectors) and the DCDB.
  - Trusted Nodes may supply data logging equipment, provide technical support to vessels, download 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).



Current CSB Trusted Nodes

Voyage Data Recorder

www.rosepointnav.com



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

SmartLog USB data logger

Non Profit

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

CSB Trusted Nodes – Seabed 2030 Project

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).

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.

CSB Trusted Nodes – Seabed 2030-funded CSB Programs

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 Zinglersen

IHO CSB Working Group

International Hydrographic Organization

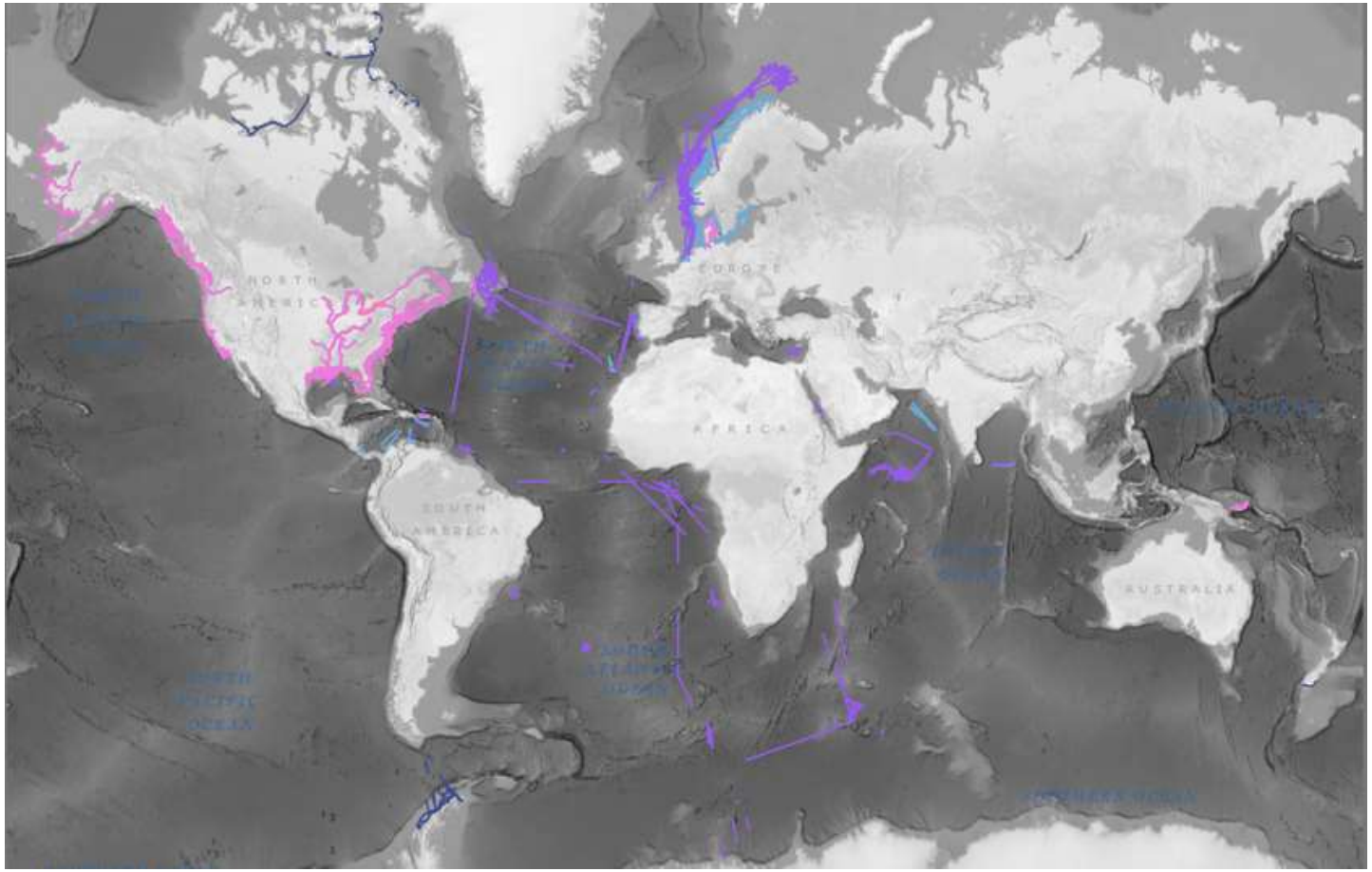
- **Meetings:** 13 meetings, 1 industry workshop
- **Chair:** Jennifer Jencks, USA; **Vice Chair**: Peter Wills, Canada
- **Representatives from 18 Member States:** Canada, China, Denmark, France, Germany, India, Italy, Lebanon, Mexico, Netherlands, New Zealand, Norway, Portugal, South Africa, Sweden,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

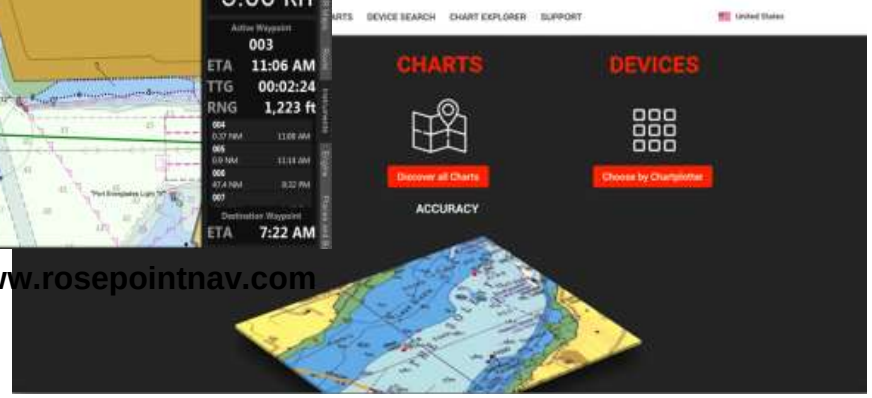
How can your HO become involved?

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



How can your HO become involved?

SmartLog USB data logger



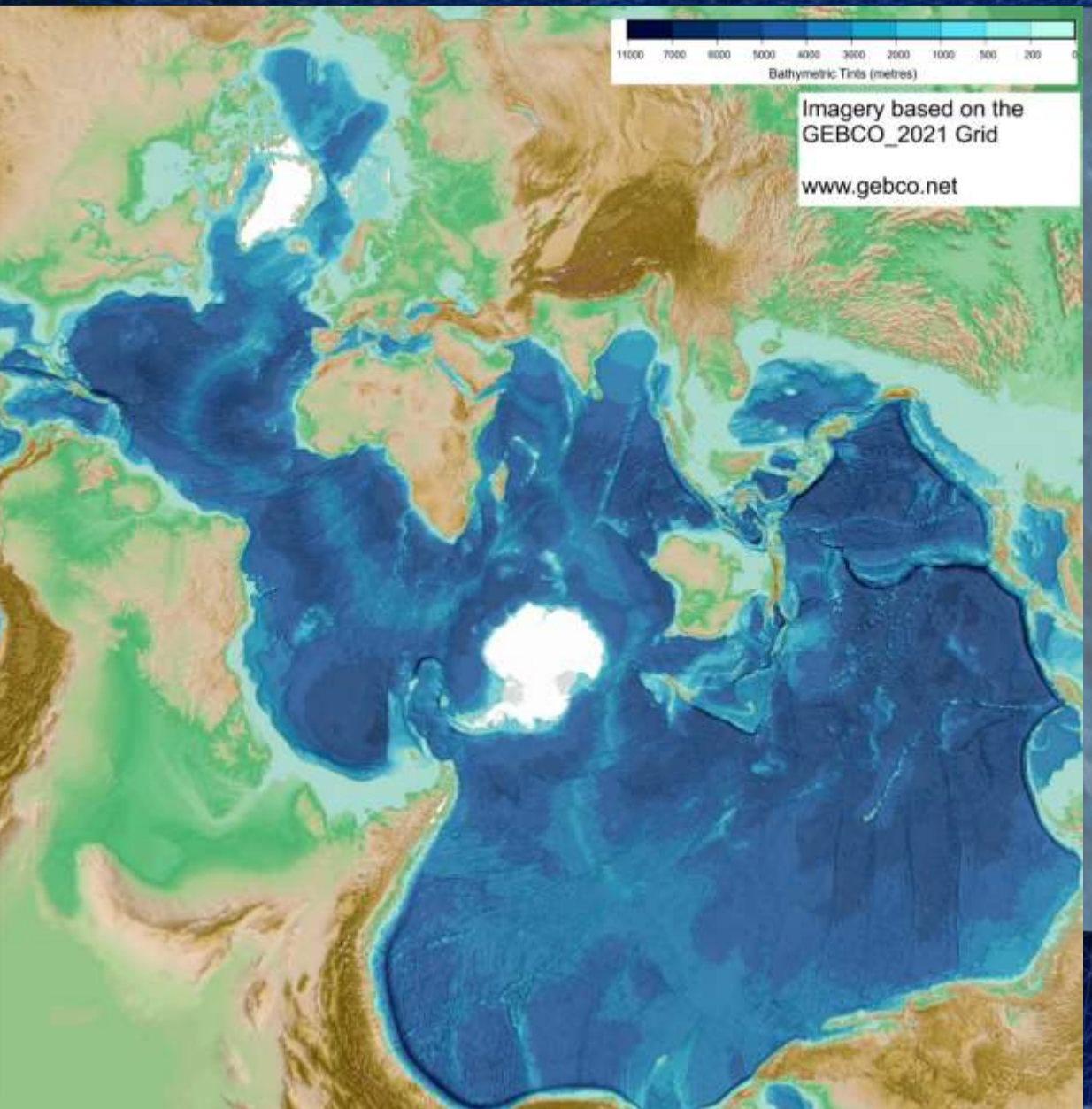
www.rosepointnav.com

- 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


ARCTIC OCEAN
ASIA
EUROPE
NORTH
AMERICA
NORTHEAST
PACIFIC
BASIN
ATLANTIC
OCEAN
AFRICA
PACIFIC
OCEAN
SOUTH
MID-INDIAN
OCEAN
BASIN
INDIAN
OCEAN
SOUTHWEST
PACIFIC
BASIN
CROZET
BASIN

Thank you.

GEBCO



GEBCO, the foundation of the Digital Twin of the Ocean