



GEBCO / Seabed 2030 Project / CrowdSourced Bathymetry Activities

Report to MBSHC-24

**Constanta, ROMANIA
2 – 4 July 2024**

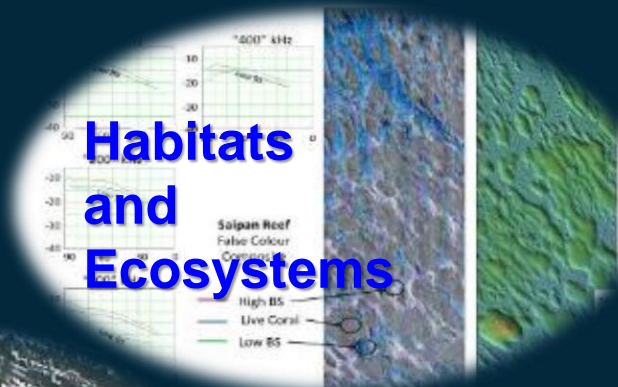
**By Rear Admiral Luigi SINAPI
IHO Director**

Thanks to the contribution of GGC Chair, Seabed2030 Director and CSBWG Chair

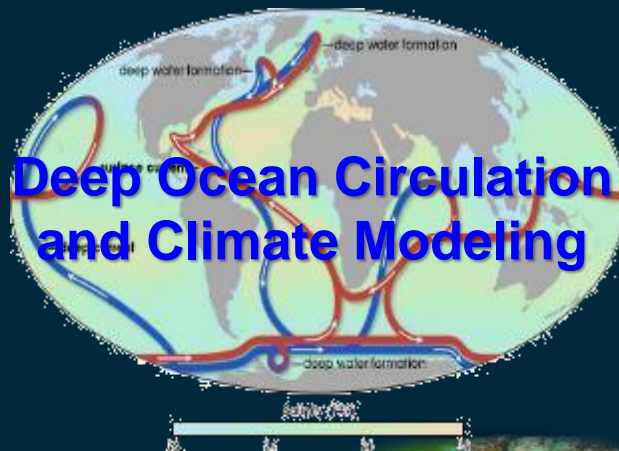
on behalf of CDR Afif Ghaith, MBSHC SB2030/CSB Coordinator

WHY MAP???

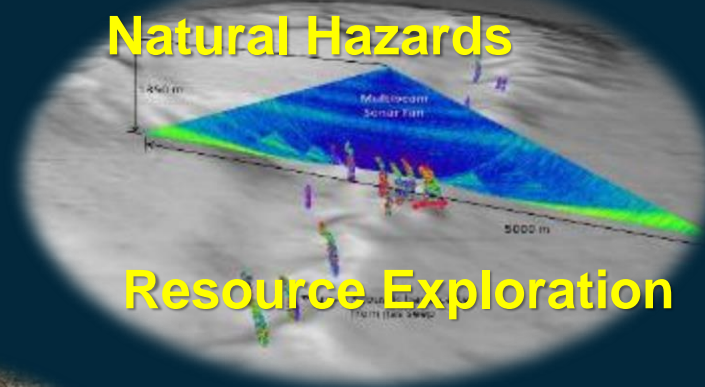
Habitats
and
Ecosystems



Deep Ocean Circulation
and Climate Modeling



Natural Hazards

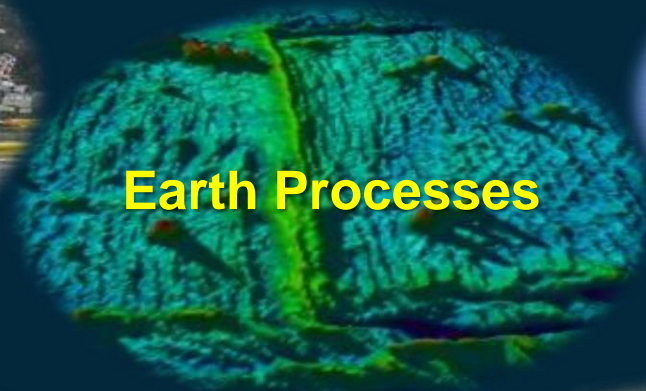


Resource Exploration

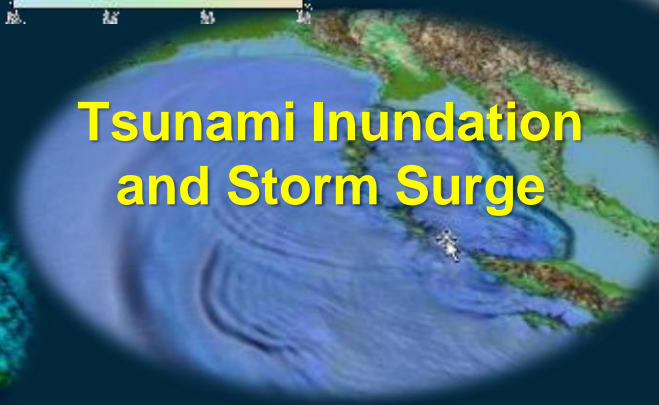
Safety of Navigation



Earth Processes



Tsunami Inundation
and Storm Surge



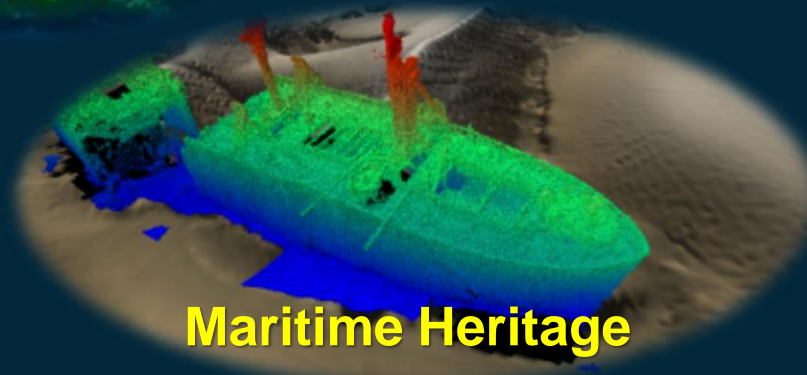
Cables, Pipelines
and Infrastructure
(Wind Farm Siting)



National Security



Maritime Heritage



Pure Exploration



?

GEBCO – General Bathymetric Chart of the Oceans

Aim: provide authoritative, publicly-available bathymetry data sets of the world's oceans

Operates under the joint auspices of

- International Hydrographic Organization (IHO)
- Intergovernmental Oceanographic Commission (IOC/UNESCO)



GEBCO Products

- Global gridded bathymetric data
 - 2014: 30 arc-second grid
 - 2019 - 2023: 15 arc-second grid
- Web Map Service (WMS)
- Gazetteer of Undersea Feature Names
- Grid viewing software
- Printable maps
- IHO-IOC GEBCO Cook Book

Home Data & Products Seabed 2030 Training News & Media About Contact

IHO International Hydrographic Organization

United Nations Educational, Scientific and Cultural Organization

General Bathymetric Chart of the Oceans

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

Gridded Bathymetry Data

GEBCO's gridded bathymetric data sets are global terrain models for ocean and land. The grids are available to download or access through Web Map Services.

Read more

Data & Products

GEBCO produces and makes available a range of bathymetric data sets and products. This includes a global bathymetric grid, gazetteer of undersea feature names, a Web Map Service and printable maps of ocean bathymetry.

Read more

Seabed 2030

Seabed 2030 is a collaborative project between the Nippon Foundation and GEBCO. It aims to bring together all available bathymetric data to produce the definitive map of the world ocean floor by 2030 and make it available to all.

Read more

Download the GEBCO grid from: gebco.net or seabed2030.org

Accessing the GEBCO Grid



Home » Data & Products » Gridded Bathymetry Data

Global ocean & land terrain models

GEBCO's gridded bathymetric data set, the GEBCO_2020 grid, is a global terrain model for ocean and land at 15 arc-second intervals. It is accompanied by a Type Identifier (TID) Grid that gives information on the types of source data that the GEBCO_2020 Grid is based.

- [Download global coverage grids](#)
- [Download data for user-defined areas](#)

More [information](#) about the grid, its terms of use and attribution.

Download global coverage grids

The GEBCO_2020 Grid and TID Grid can be download as global files in netCDF format or a set of 8 tiles (each with an area of 90° x 90°), giving global coverage, in Esri ASCII raster and data GeoTiff formats. The data files are included in a zip file along with the data set documentation.

GEBCO_2020 Grid	netCDF (4 Gbytes, 7.5 Gbytes uncompressed)	Data GeoTiff (4 Gbytes, 8 Gbytes uncompressed)	Esri ASCII raster (5 Gbytes, 20 Gbytes uncompressed)
GEBCO_2020 TID Grid	netCDF (90 Mbytes, 4 Gbytes uncompressed)	Data GeoTiff (96 Mbytes, 7 Gbytes uncompressed)	Esri ASCII raster (108 Mbytes, 9.5 Gbytes uncompressed)

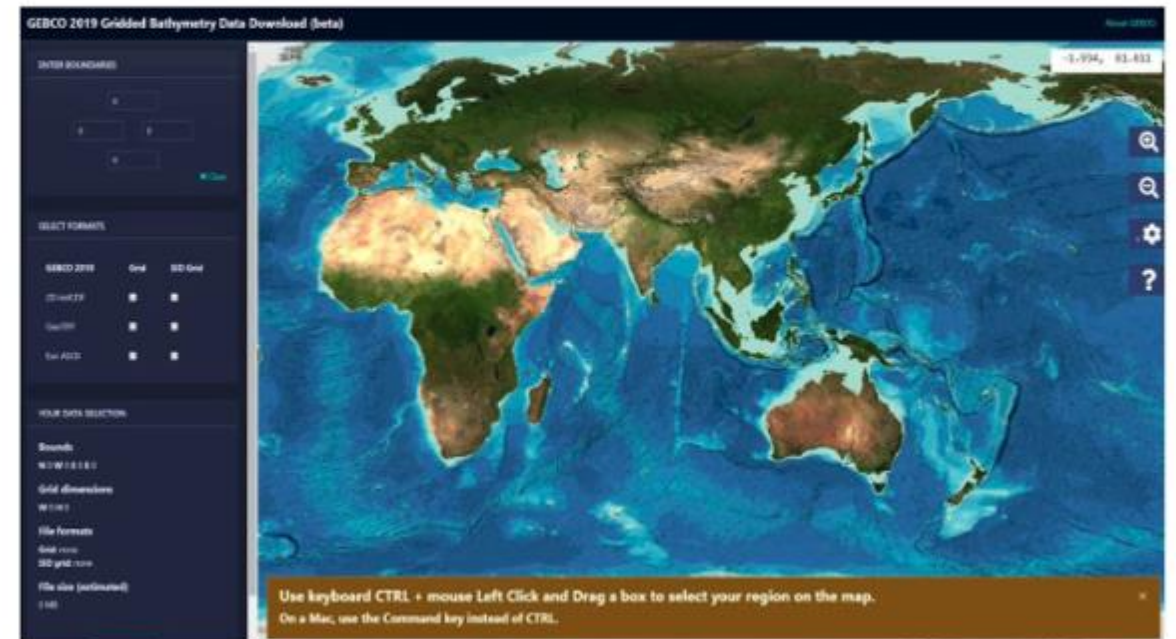
Jump to

- > [Seabed 2030](#)
- > [Contribute data](#)
- > [IBCAO_v4](#)
- > [GEBCO Web Services](#)
- > [Printable maps](#)
- > [Historical GEBCO data sets](#)
- > [Imagery](#)
- > [Undersea feature names](#)
- > [Historical GEBCO charts](#)
- > [IHO-IOC GEBCO Cook Book](#)
- > [History of GEBCO book](#)

Share this

Download data for user-defined areas

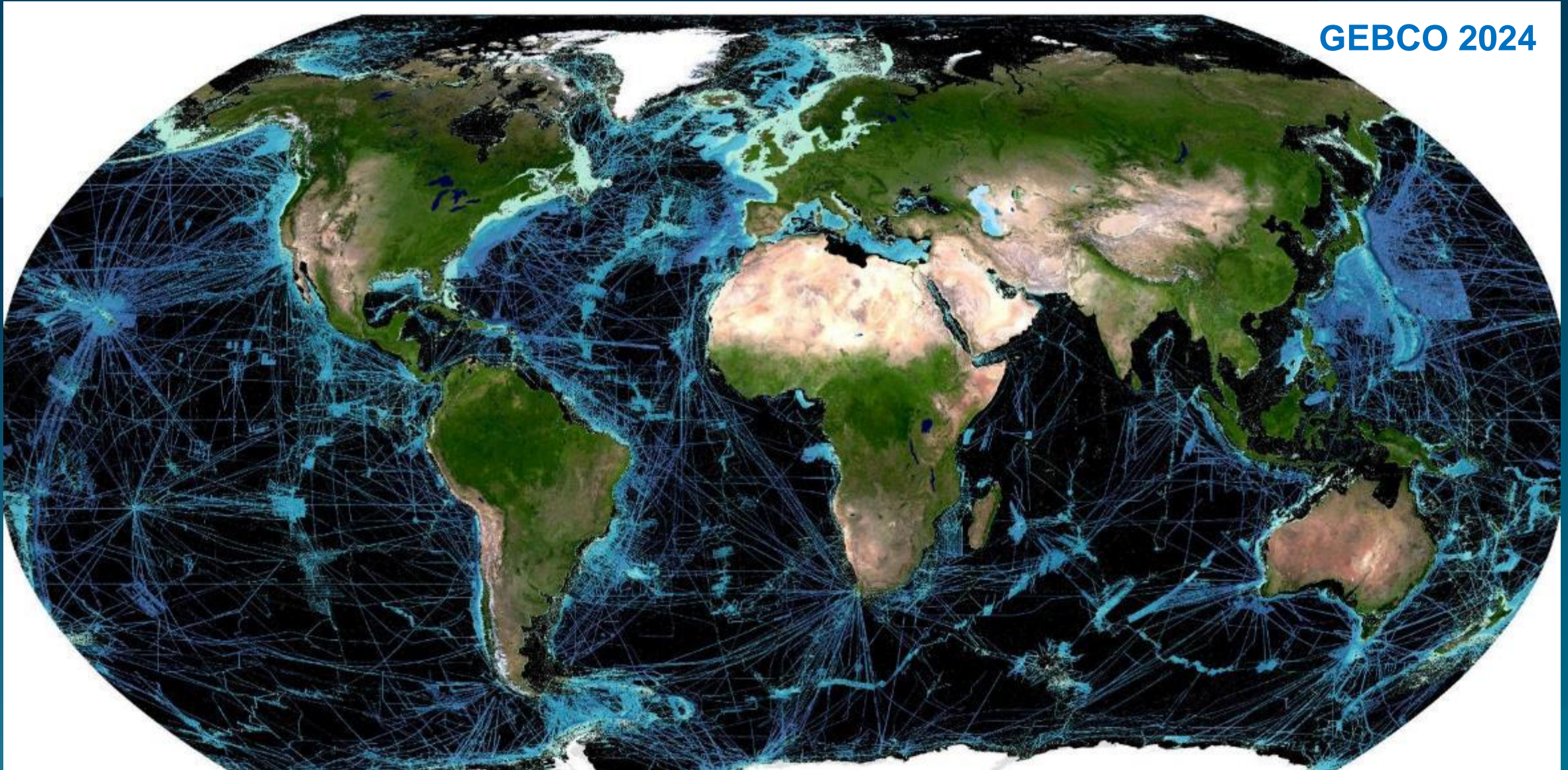
Use our [application](#) to select and download data in netCDF, Esri ASCII raster and data GeoTiff formats.



Download the GEBCO grid from: gebco.net or seabed2030.org

How much of the Global Ocean is Mapped?

GEBCO 2024



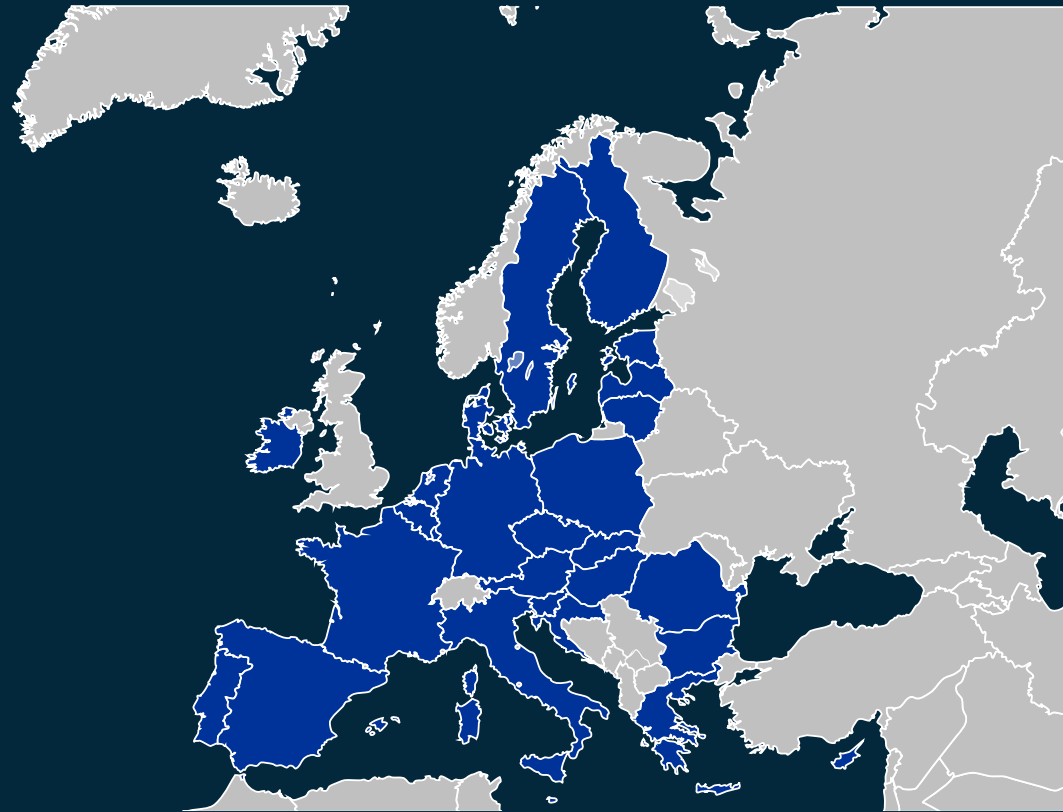
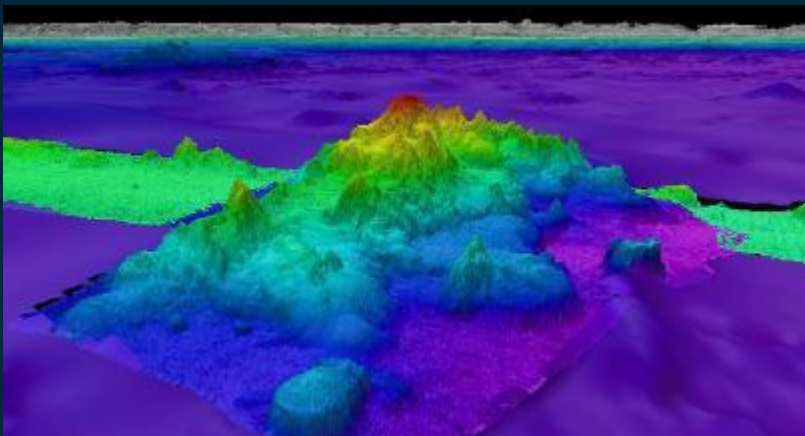
26.1 % mapped – marked an increase of 4.34 km²

Progress so far ...

Apr 23 to Jun 24

4.34 million km² new bathymetry added

- Equates to size of EU



Credit: [Wikipedia](#) Kolja21

Courtesy: Martin Jakobsson, SU

.... a significant quantity of data

THE NIPPON FOUNDATION-GEBCO

SEABED
2030

SEABED 2030

Energizing Global Ocean Floor Mapping

Prepared by:

Vicki Ferrini, PhD

Head of Seabed 2030 Atlantic & Indian Ocean Regional Center
Lamont-Doherty Earth Observatory of Columbia University



What is Seabed 2030?

The Nippon Foundation - GEBCO Seabed 2030 Project is a collaborative project to inspire the complete mapping of the world's ocean by 2030, and to compile all bathymetric data into the freely-available GEBCO Ocean Map.

Seabed 2030 aspires to empower the world to make policy decisions, use the ocean sustainably, and undertake scientific research that is informed by a detailed understanding of the global ocean floor.



The Nippon Foundation-GEBCO Seabed 2030 Project



June 2016



June 2017



June 2021

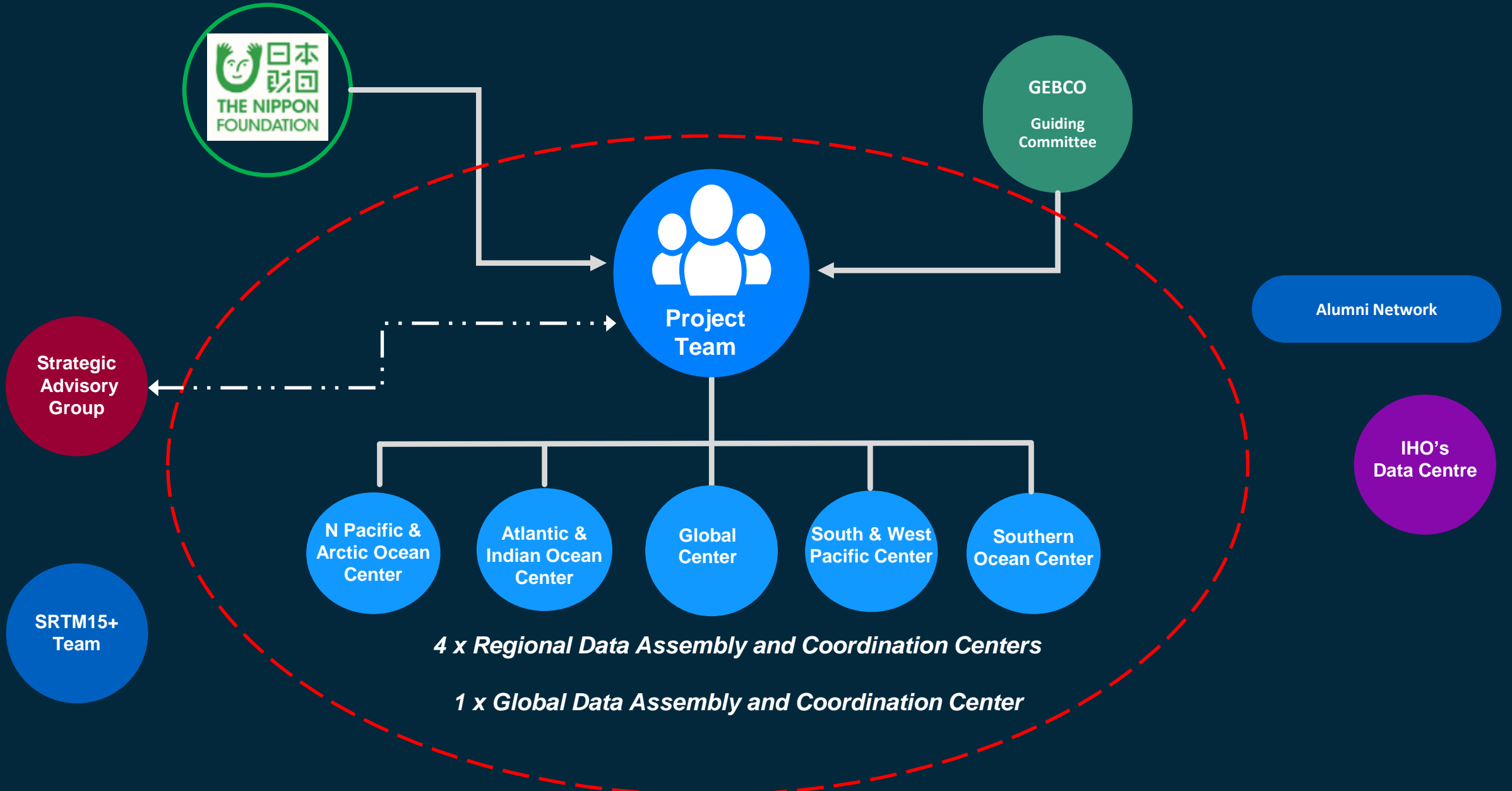
Flagship Programme

Seabed 2030 = accelerator to GEBCO's aim

Collaboration to:

- inspire 100% seabed mapping by 2030
- compile the GEBCO Map

Seabed 2030 Simplified Network

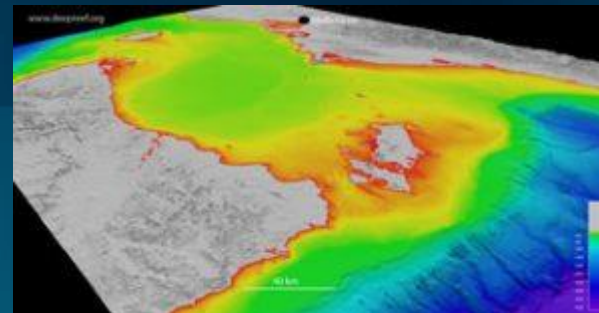
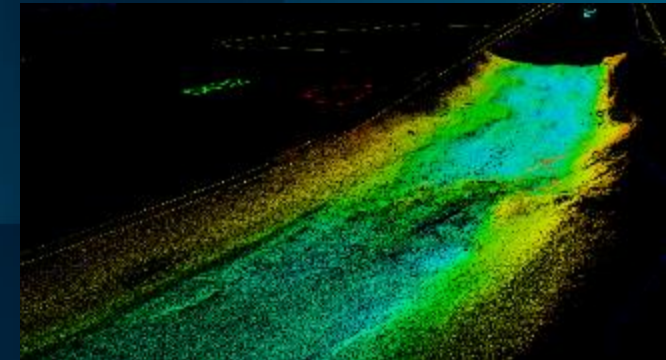
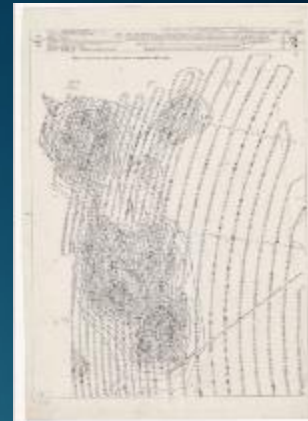


What is meant by data?

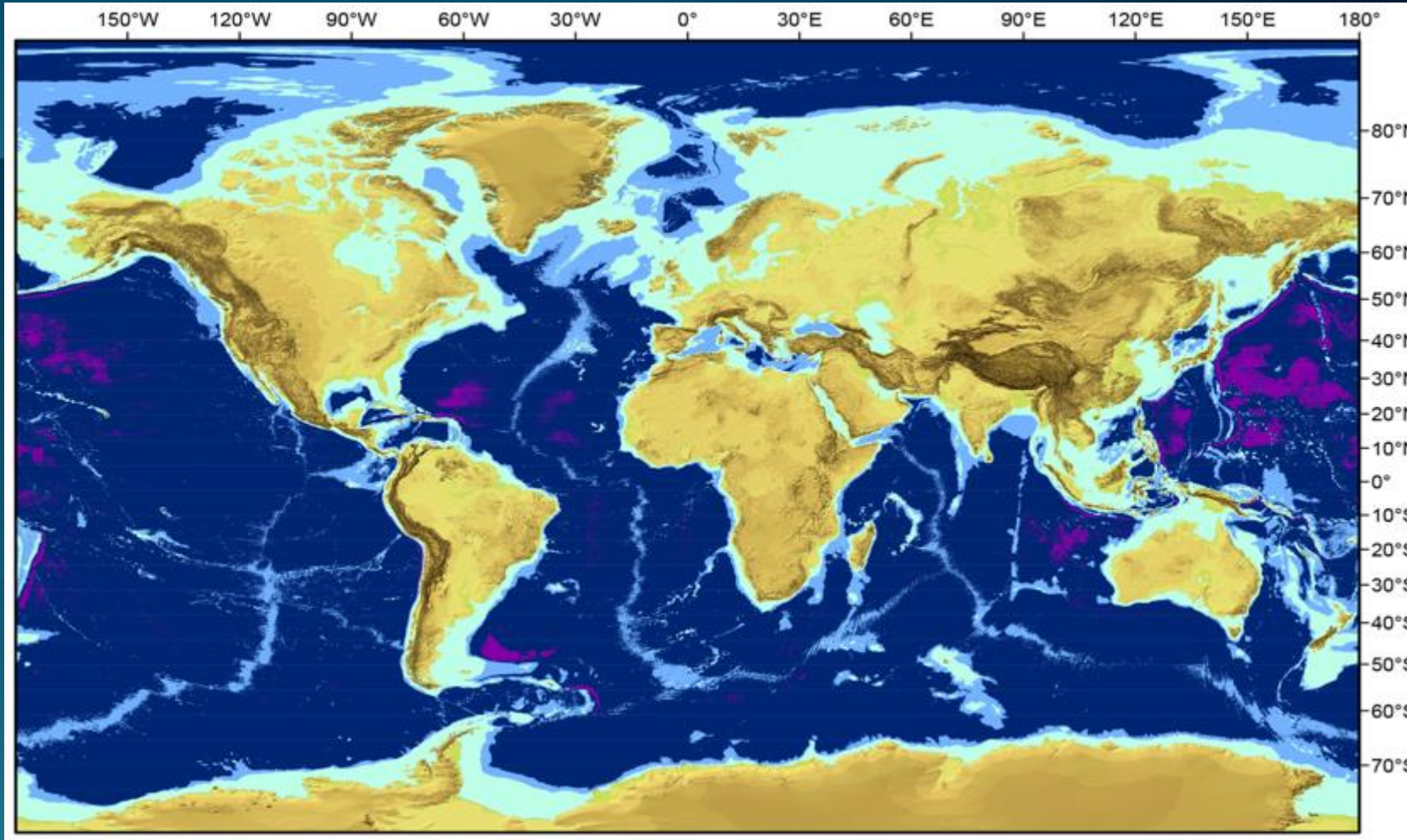
Any form of data that contains a bathymetric measurement is gratefully accepted by Seabed 2030 and by GEBCO!

Examples of data are:

- Sounding sheets
- Raw data from sounders
- NMEA data (e.g. from CSB data loggers)
- Processed data (e.g. GSF or XYZ)
- S-57 ENC
- Processed grids or bathymetric surfaces
- Regional bathymetric products

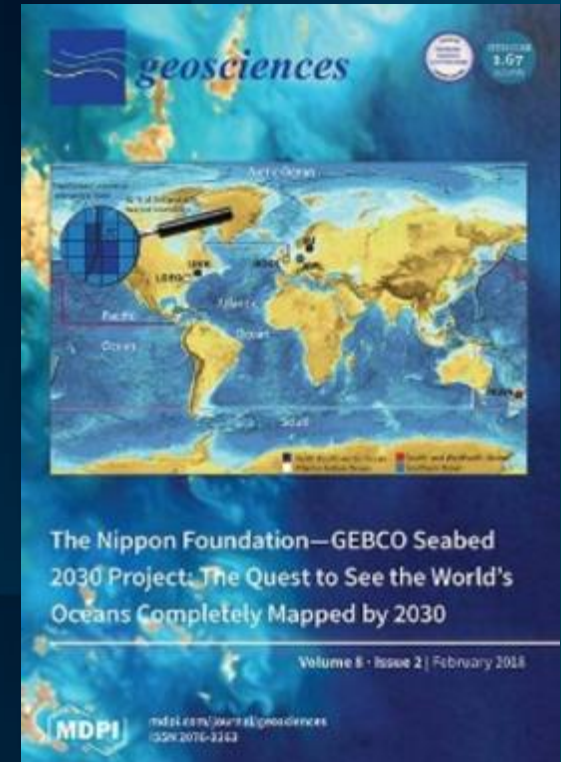


What does 100% mapped mean?



100x100 m (0-1500 m)
400x400 m (3000-5750 m)

200x200 m (1500-3000 m)
800x800 m (5750-11000 m)



Mayer et al., 2018

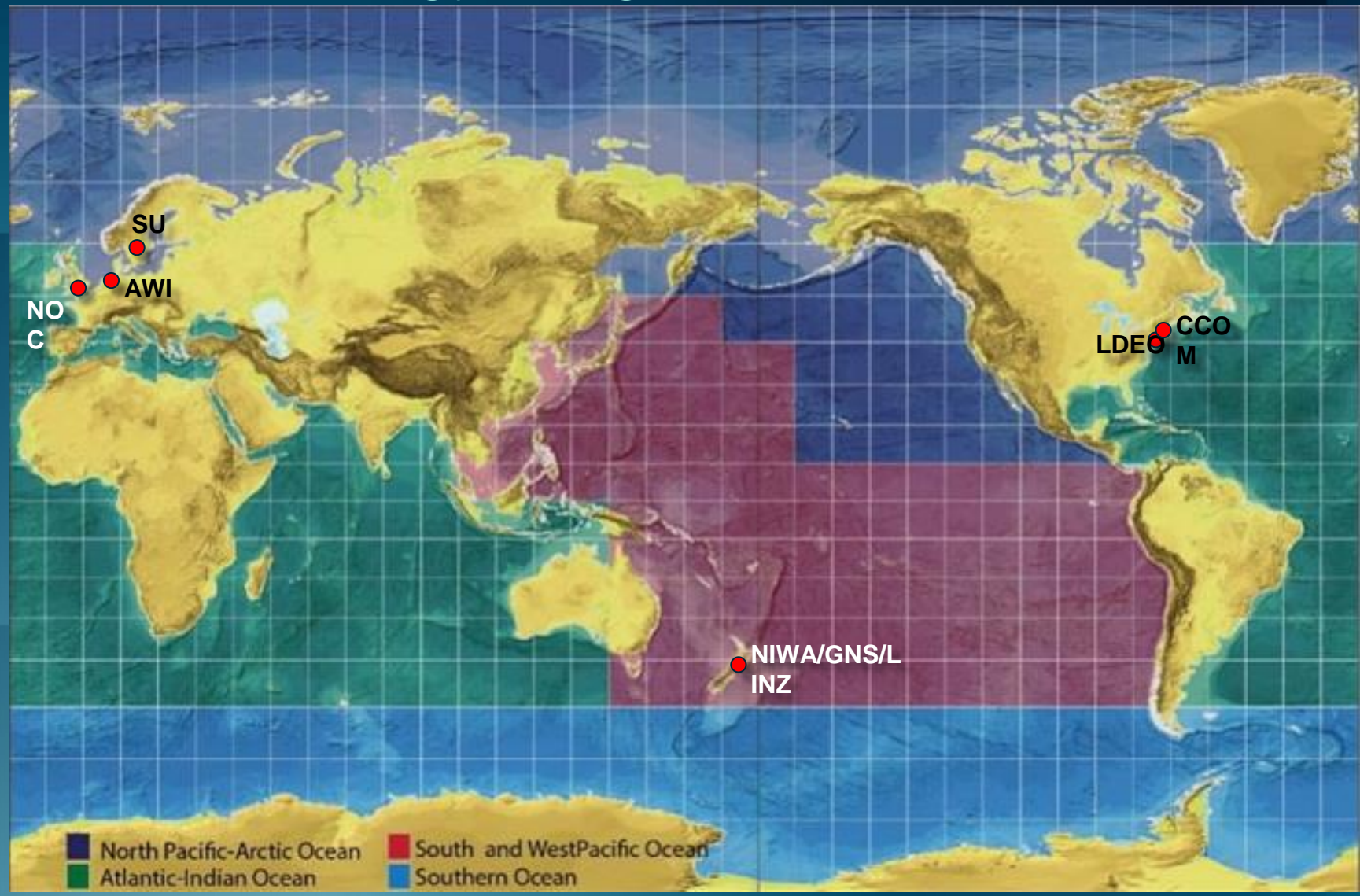
Target Resolutions

- Depth dependent
- We will never ask for data of any higher resolution than:
 - 1 x depth value in 100x100m box

At best only one depth value in area ~ size of a soccer pitch



Seabed 2030 Strategy: Regional Approach



Seabed 2030 Strategy: Regional Approach




- Coordinate with stakeholders
 - Build upon ongoing regional efforts
 - Understand needs
 - Promote a culture of data & knowledge sharing
- Ensure attribution of contributors
- Identify data gaps
- Assemble regional & global data products

North Pacific-Arctic Ocean
 South and West Pacific Ocean
 Atlantic-Indian Ocean
 Southern Ocean



IHO DCDB: MBSHC Data Availability

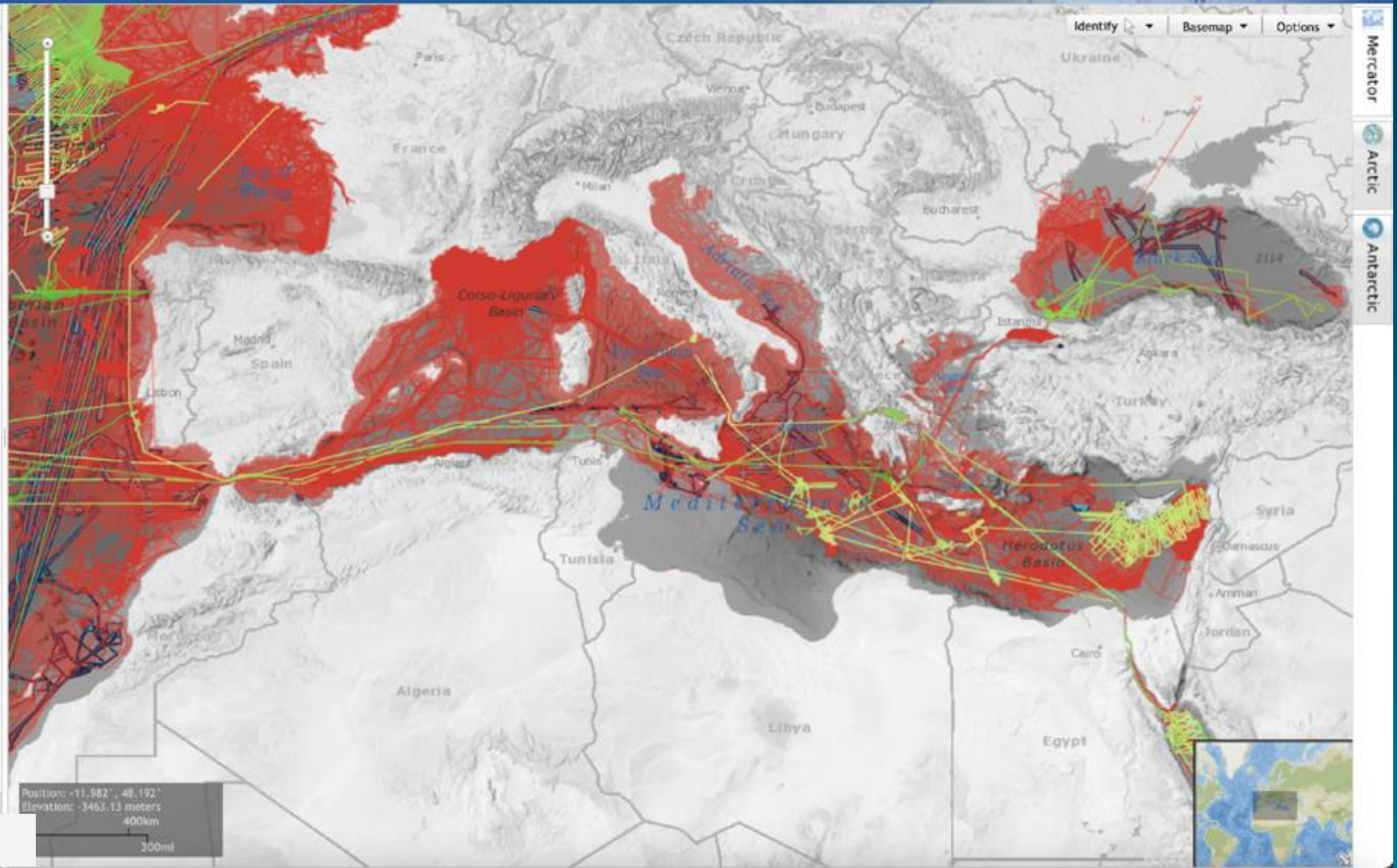


IHO
International Hydrographic Organization

Data Centre for Digital Bathymetry Viewer

Layers

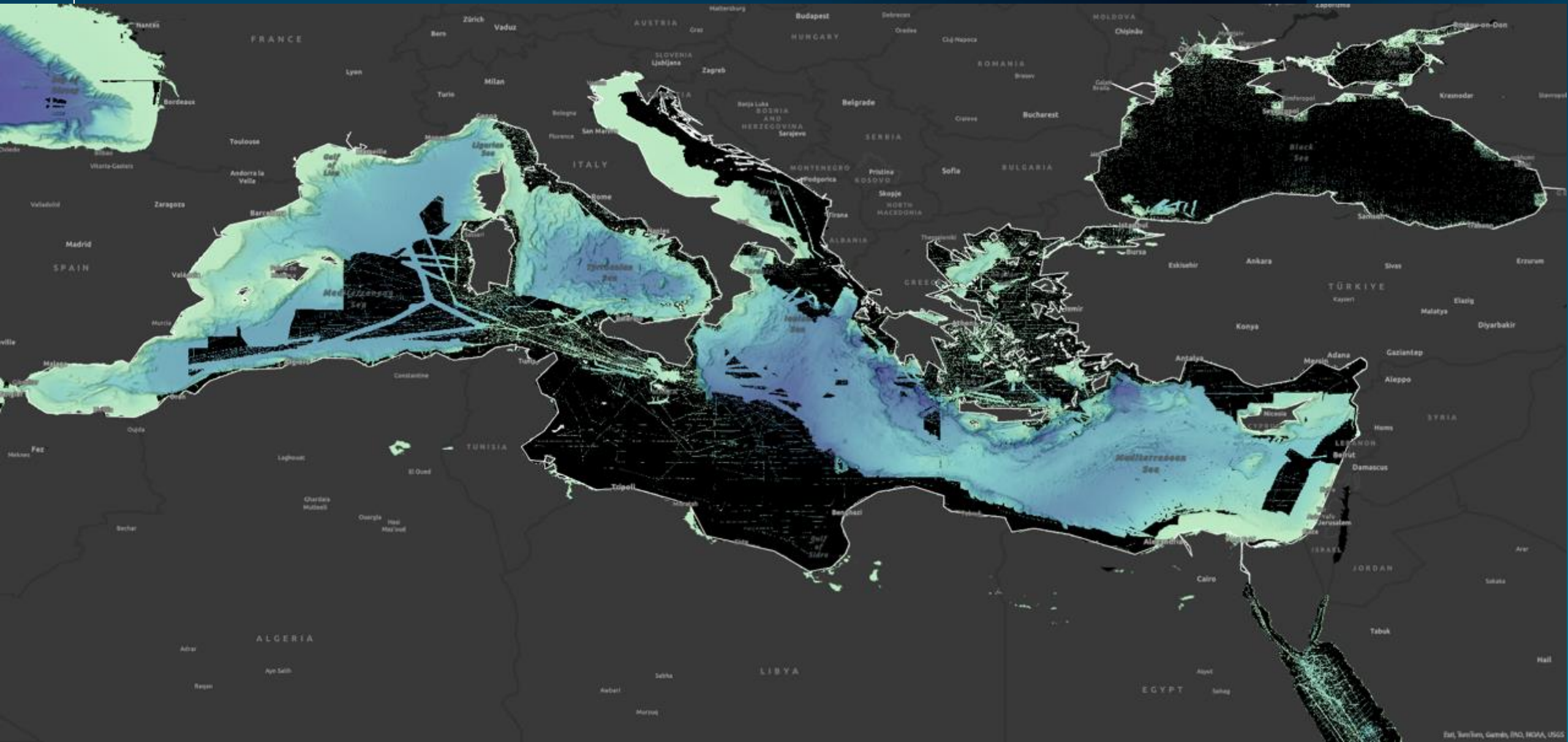
- IHO DCDB/NOAA NCEI
- EMODnet
 - EMODnet Global Survey Tracks/Polygons
 - EMODnet Digital Terrain Model (DTM)
- Australia
- Canada
- Cape Verde
- France
 - IFREMER RAW Multibeam
 - SHOM Bathymetric Grids
- Germany
 - AWI Processed Multibeam Data Coverages
 - PANGAEA Multibeam Raw Data Footprints
 - PANGAEA Multibeam Processed Data Footprints
 - PANGAEA Multibeam Raw Data Bathymetry
 - PANGAEA Multibeam Processed Data Bathymetry
- Japan
- Netherlands
- New Zealand
- Norway
- Portugal
 - SEAMAP 2030 Bathymetric Grids
- United Kingdom
 - UKHO 100m Bathymetry Shaded Relief
- Other Data Sources
 - Known Non-Public Data
 - Bathymetric Coverage Maps



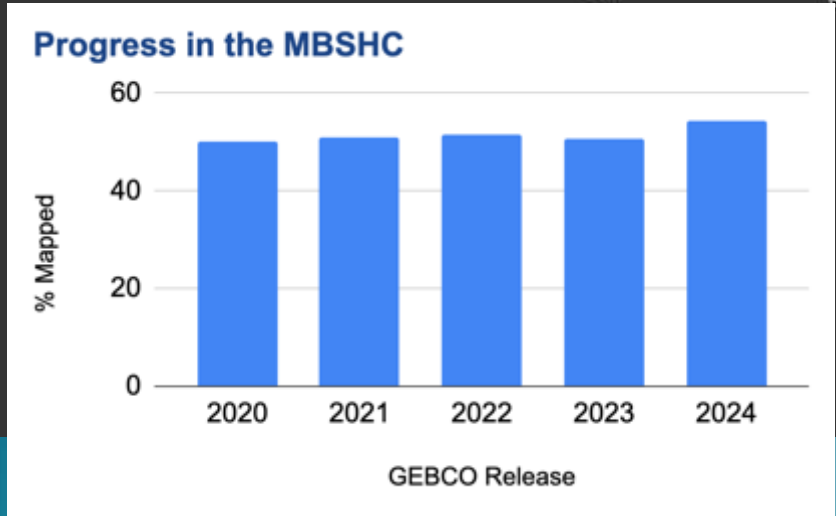
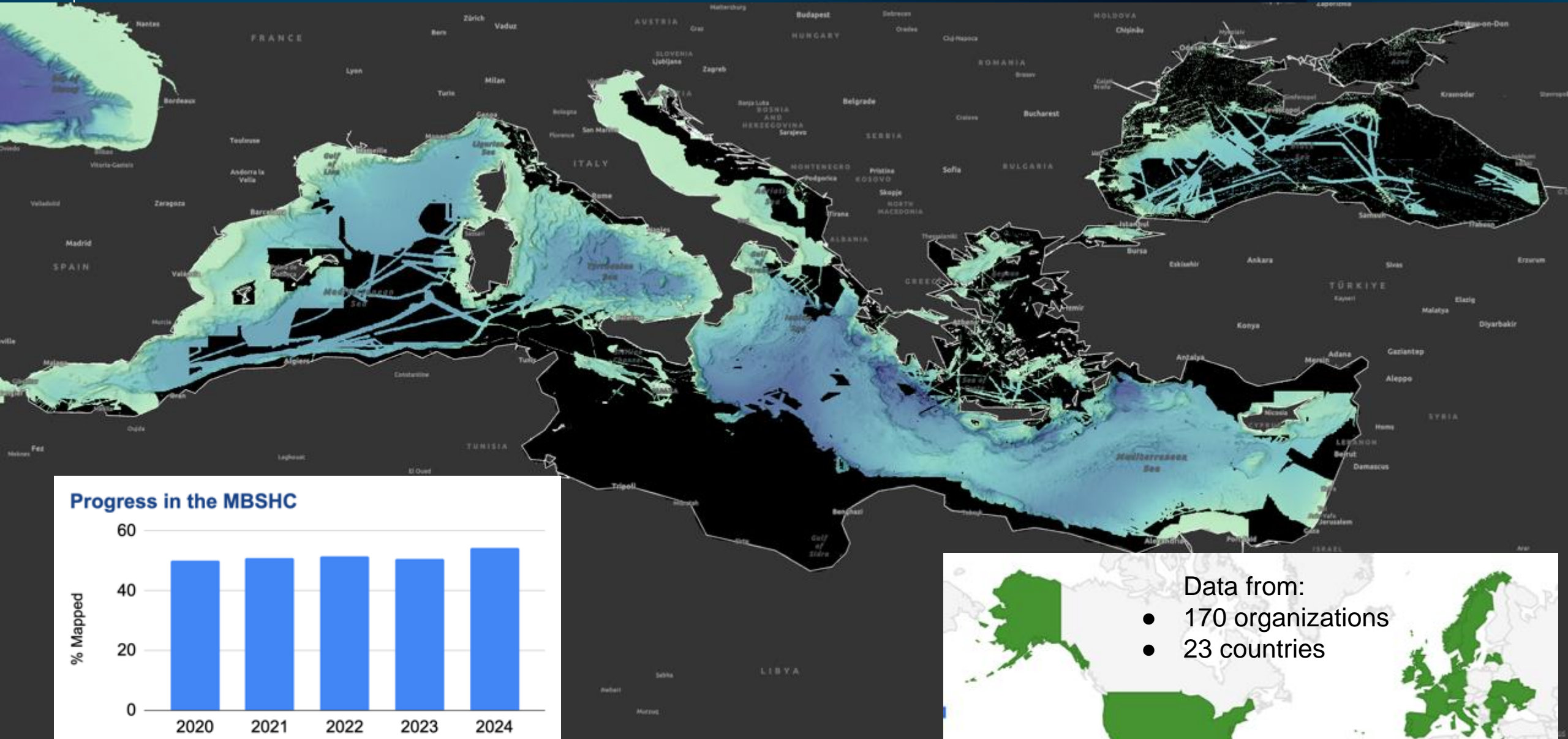
Position: -11.982°, 48.192°
Elevation: -3463.13 meters
400km
300mi

ncei.noaa.gov/maps/iho_dcdb/

GEBCO 2020: MBSHC 50% mapped

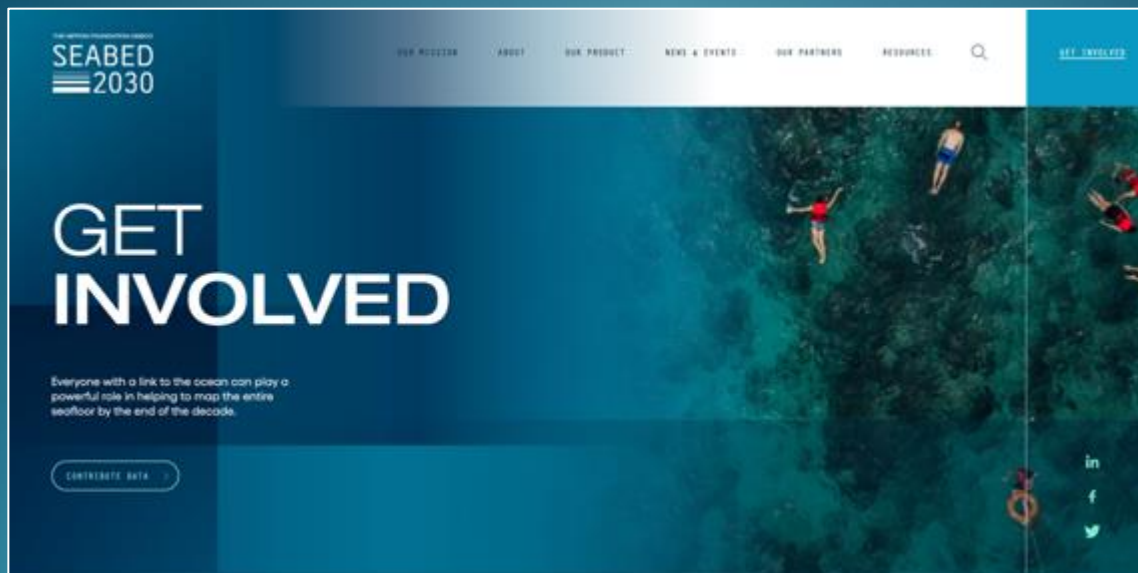


GEBCO 2024: MBSHC 54.23% mapped



Conclusions

- Data coverage steadily increasing in the MBSHC region
- Collaboration and coordination is critical to achieving mutual goals
- Regional Center Team available to assist
- Please contact Regional Center with questions or requests

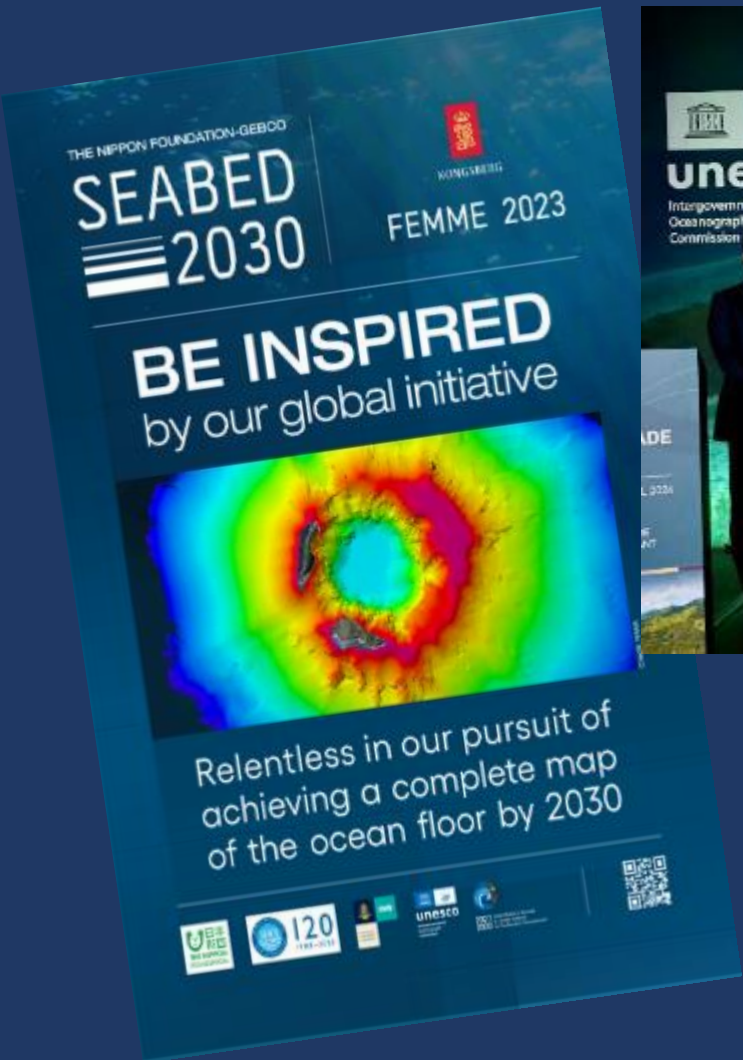


Atlantic and Indian Oceans Regional Center
atlantic-indian@seabed2030.org

www.seabed2030.org

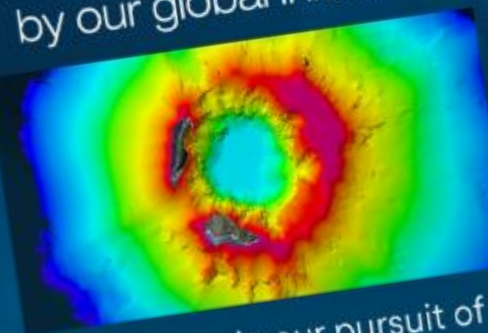
<https://seabed2030.org/get-involved/>

Outreach is vital, engage widely, & as early as possible.





THE NIPPON FOUNDATION-GEBCO
SEABED 2030
WONG BERG
FEMME 2023

BE INSPIRED
by our global initiative



Relentless in our pursuit of achieving a complete map of the ocean floor by 2030



THE NIPPON FOUNDATION-GEBCO

SEABED 2030

PODCAST



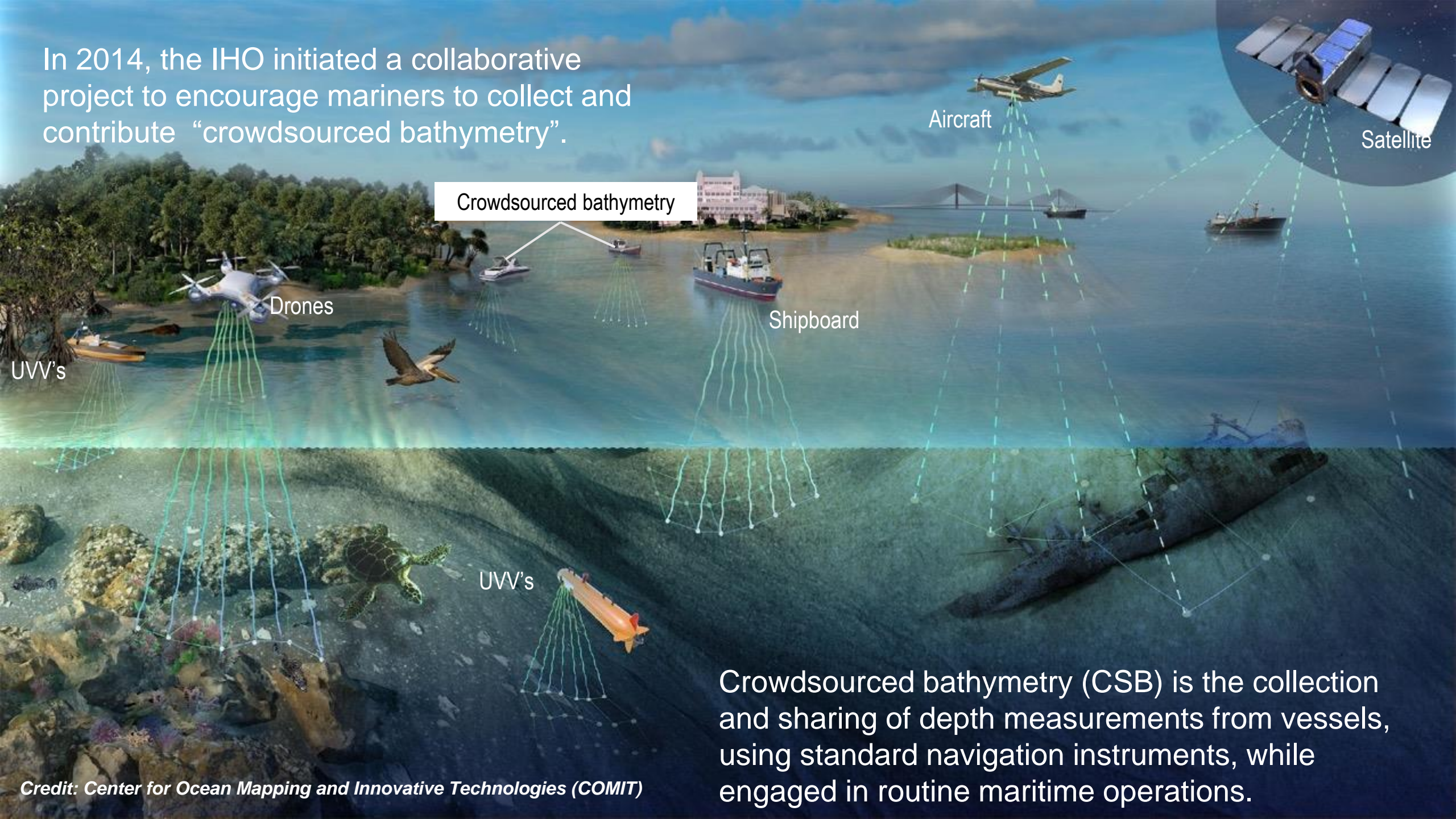
Crowdsourced Bathymetry

A benefit for all States

Prepared by:
Jennifer Jencks & Belen Jimenez Baron
Chair & Vice Chair IHO CSBWG



In 2014, the IHO initiated a collaborative project to encourage mariners to collect and contribute “crowdsourced bathymetry”.



Crowdsourced bathymetry (CSB) is the collection and sharing of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations.

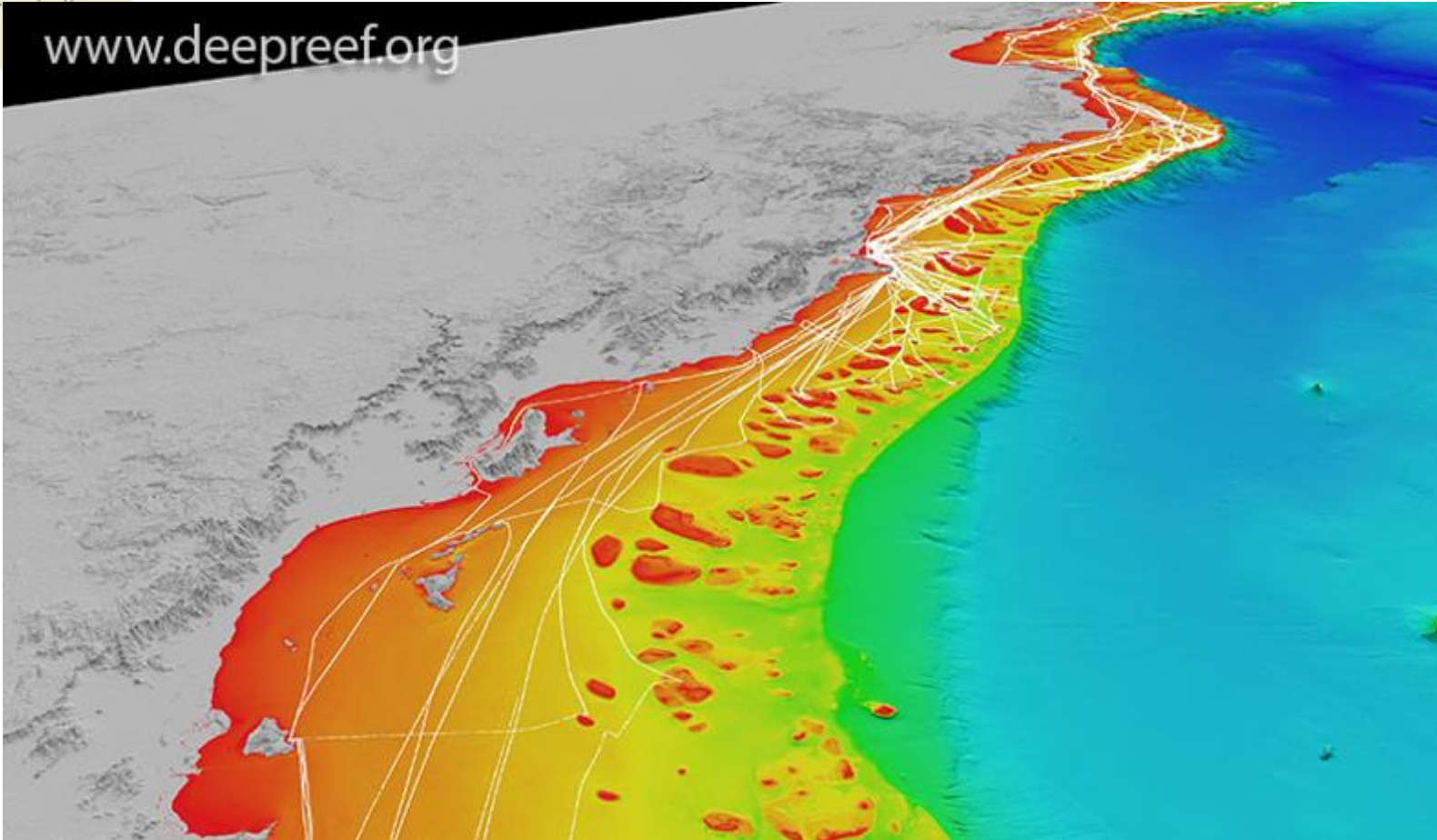


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The Value of CSB Data

International
Hydrographic
Organization

www.deepreef.org



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

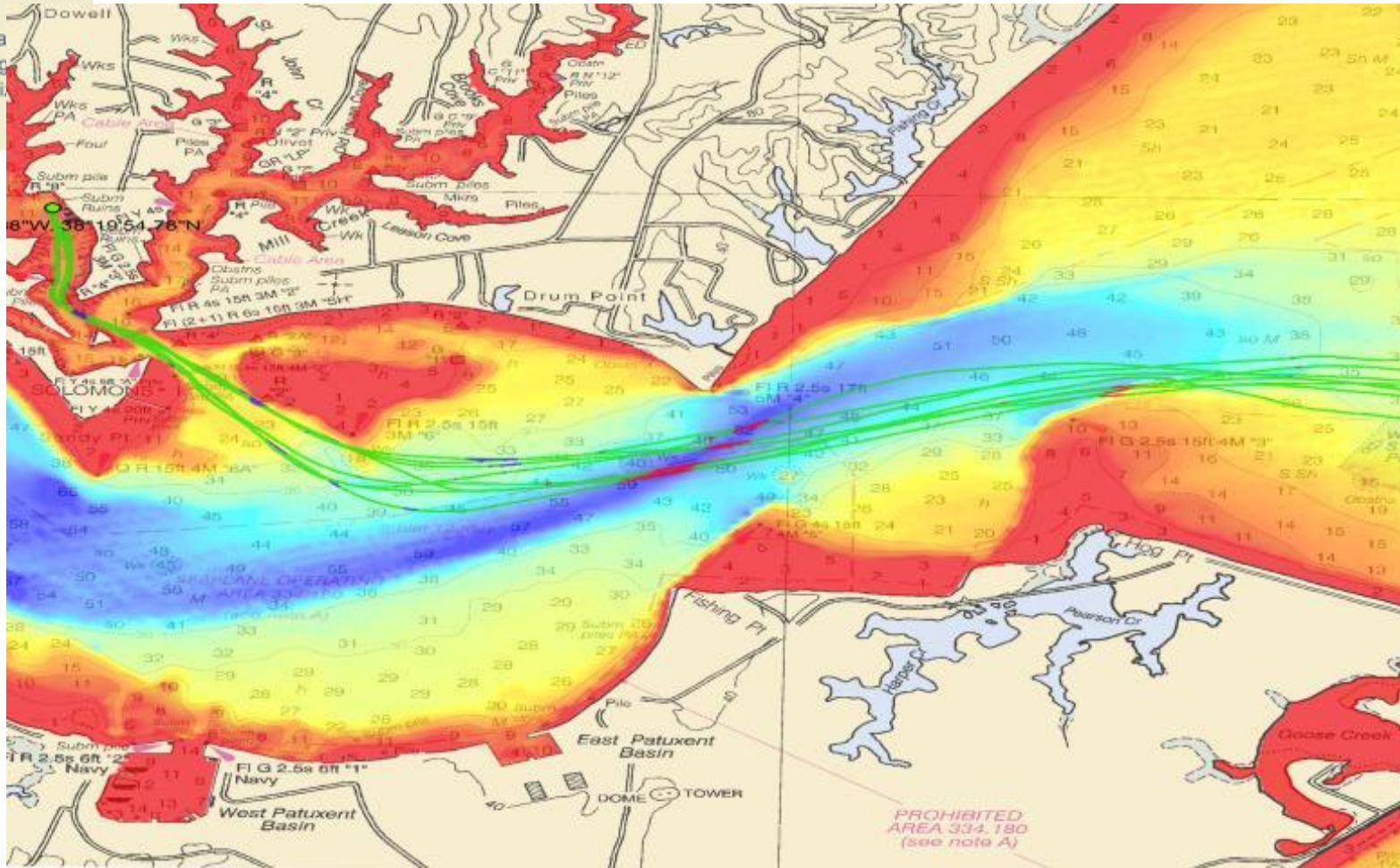
Credit: Robin Beaman

- Data with scientific, commercial & research value at little to no cost to the public sector
- Fill gaps where data is scarce (eg: Large Pacific Ocean States)
- Improving safety of navigation
- Supporting prioritisation for Hydrographic Authorities



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Example Use: CSB as Input to Resurvey Schemes



- CSB data as a complementary data set, not as a replacement
- Identify changes
- Confirm whether charts are appropriate for the latest traffic patterns.
- Serve as an early warning system for potential navigational hazards
- Assist in routine survey planning and prioritization.

CSB test tracks collected on NOAA's Research Vessel Bay Hydro II in green overlaid on multibeam survey data demonstrates how changes can be detected. Image courtesy of NOAA.



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Organization

CSB-BASED RESOURCES

CURRENT & UNDER DEVELOPMENT

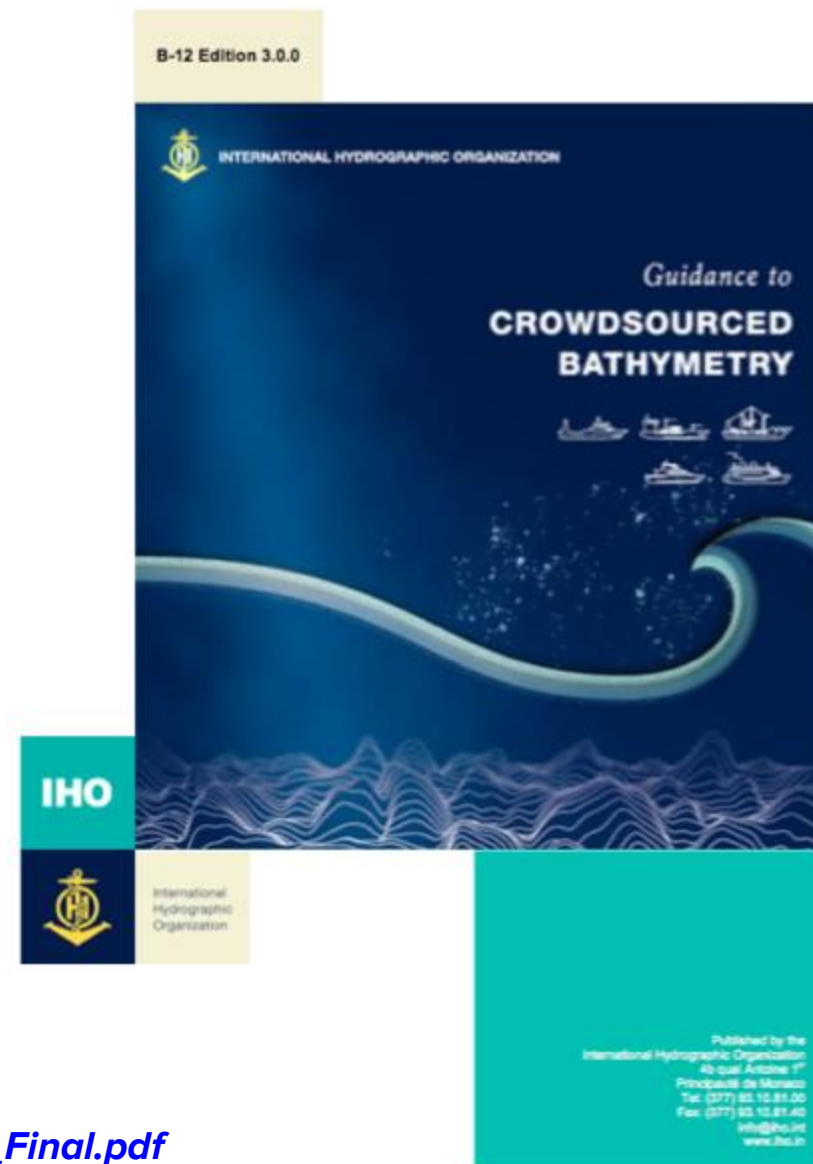


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B-12 IHO Guidance on Crowdsourced Bathymetry

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Organization

The CSBWG developed and maintains **B-12 IHO Guidance on Crowdsourced Bathymetry**, that states the IHO's policy towards, and best practices for, the collection and contribution of CSB.



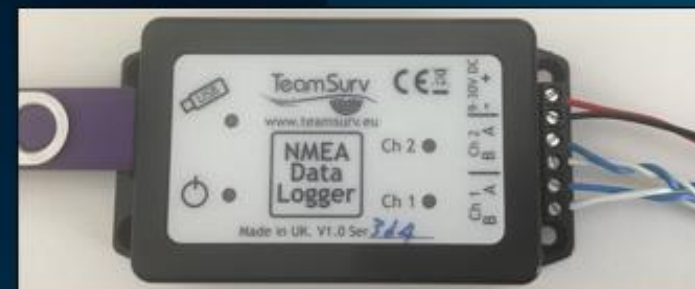
iho.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf

Data Loggers provided by Seabed 2030

Free data loggers provided to the community

Installation support

Assistance with data download and delivery to Seabed 2030 & IHO-DCDB





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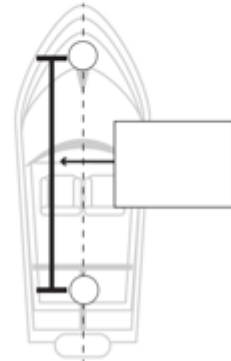
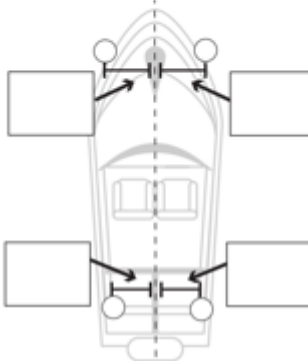
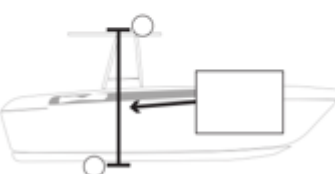
CSB User Tools

International Hydrographic Organization

CROWDSOURCED BATHYMETRY - VESSEL OFFSET MEASUREMENTS

Measurement Units (Circle One): meters (m) inches (in)

○ = Sensors (your GPS Antenna (not console) and Depth Sounder) - - - Vessel's Mid-Line
 ← → Measurements

<p>Measurement 1 How far apart are the sensors in the fore/aft direction?</p>  <p>GPS Antenna forward of Sonar ← (circle one) → aft (behind) Sonar</p>	<p>Measurement 2 How far from the mid-line of the boat is each sensor*?</p>  <p>*Could be zero (0) if sensor is on midline. NOTE: Only 1 side of the center line needs to be filled in per sensor.</p>
<p>Measurement 3 How far apart are the sensors in the vertical direction?</p> 	<p>Participant Information</p> <p>Name: _____</p> <p>Email: _____</p> <p>Vessel: _____</p> <p>Approx. Draft (optional): _____ in or ft?</p> <p>Vessel Length (optional): _____ in or ft?</p>

Send a picture of this form to cms-comit@usf.edu

© & Innovative Technologies, University of South Florida (2023)



WIBL Install Tutorial

A brief video tutorial of how to install the Wireless Inexpensive Bathymetry Logger (WIBL) developed by UNH CCOM/JHC (Brian Calder et al.). Applicable only to vessels with NMEA 2000 networks – NMEA 0183 tutorial forthcoming.



Vessel Offset Worksheet


A printable version of how to measure vessel offsets when installing a logger aboard a new vessel – or if a vessel has changed its equipment configuration. A picture or scan of the document can be sent to us at cms-comit@usf.edu.



Vessel Offset Online Form

An online option for submitting vessel offset metadata which can be done via a browser window on a laptop or cell phone. [Click here](#) to view a larger picture of the offset schematic.

<https://www.marine.usf.edu/comit/csbttools/>



WIBL Install Tutorial
Unlisted

COMIT | Center for Ocean Mapping & Innovative Tech
21 subscribers

Like Share Download Clip Save

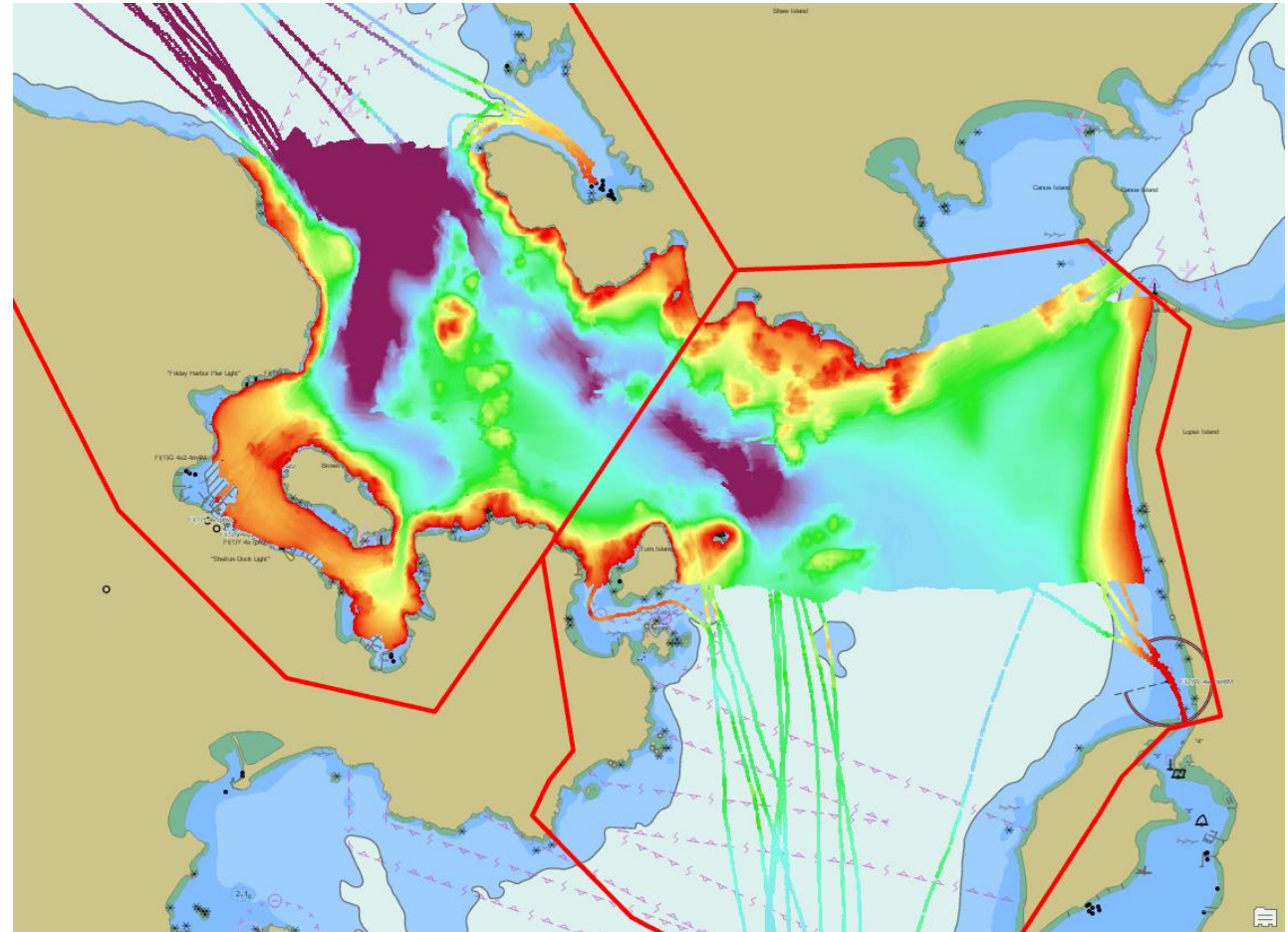


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CSB Processing Tools

NOAA is working to improve a publicly available CSB Processing Tool, including making it compatible with different tide data formats to be used in countries outside the NOAA Tidal Data API network.

- **Filter/Clean data** (i.e. erroneous dates, vessels named “Anonymous,” obvious depth fliers/outliers)
- **Tide correct** using discrete zone tide definitions
- **Derive and apply estimated vertical transducer offset** (transducer draft)
- **Grid/interpolate data**





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Geographic Filter

International
Hydrographic
Orga

Trace Id	Publish	External Id	Provider	Platform	Instrument	Start Time	End Time	File Name	File Size	Last Updated
000033e4-759c-4591-af98-04c29f6b967b	true	MACGR-9221566-AIDAAJURA-oyHjp01t	MacGregor	Anonymous		2020-03-28T03:08:33Z	2020-03-28T03:10:16Z	20220322085844674039_9221566-AIDAAJURA-oyHjp01t.tar.gz	965	2022-03-28T21:17:48.738516Z
000042ca-d435-4d84-ae4-ec04163d4dc2	true	MACGR-9221566-AIDAAJURA-oyHjp01t	MacGregor	Anonymous		2020-04-29T03:00:32Z	2020-04-29T03:02:36Z	20220322083434750180_9221566-AIDAAJURA-oyHjp01t.tar.gz	798	2022-03-28T15:16:03.354039Z

- The DCDB has developed a CSB Coastal State Review Application to automate the approval process of data for coastal states who have provided positive responses but request pre-approval of data before the public distribution from DCDB.
- Deployment of the application expected this Summer



IHO

CSB Working Group

Representatives from 18 Member States: Canada, China, Denmark, France, Germany, India, Iran, Italy, Lebanon, Mexico, Netherlands, New Zealand, Norway, Portugal, South Africa, Sweden, UK, Uruguay, USA

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



CSBWG14 - Stavanger, Norway, August 2023

The CSBWG is a great way to learn about CSB!

There is active participation from representatives of hardware and software companies along with scientists and hydrographers eager to collect and use these data.

If you want to learn more about the technology, the progress of ongoing projects, and new projects or if you or your Hydrographic Offices have questions or concerns about CSB data collection or sharing, consider joining or just attending the CSBWG.

OR...reach out to you CSB Coordinator!

CSBWG16 - March 2025, New Zealand



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YOUR RHC CSB/Seabed 2030 Coordinator

Suggested Coordinator Activities:

- Ensure that SB2030 & CSB are part of the RHC agenda.
- Liaise with appropriate SB2030 Regional Data Centres
- Serve as a member of the IHO CSBWG & as the point of contact to the relevant Seabed 2030 Regional Centers. Attend both meetings.
- Provide updated SB2030 and CSB statistics and information to RHC (presentation and report) to be included in annual IRCC report.
- Encourage positive responses to IHO CL 21/2020 and IRCC CL 01/2020
- **Listen and understand your positions and concerns!**





Thank You

By Rear Admiral Luigi SINAPI

IHO Director

on behalf of:

CDR Afif Ghaith, MBSHC SB2030/CSB Coordinator