THE NIPPON FOUNDATION-GEBCO



Seabed 2030, CSB & IHO DCDB Update to the MACHC

Diego Billings CSB/Seabed 2030 Coordinator for the MACHC Diego.Billings@nla.gov.jm

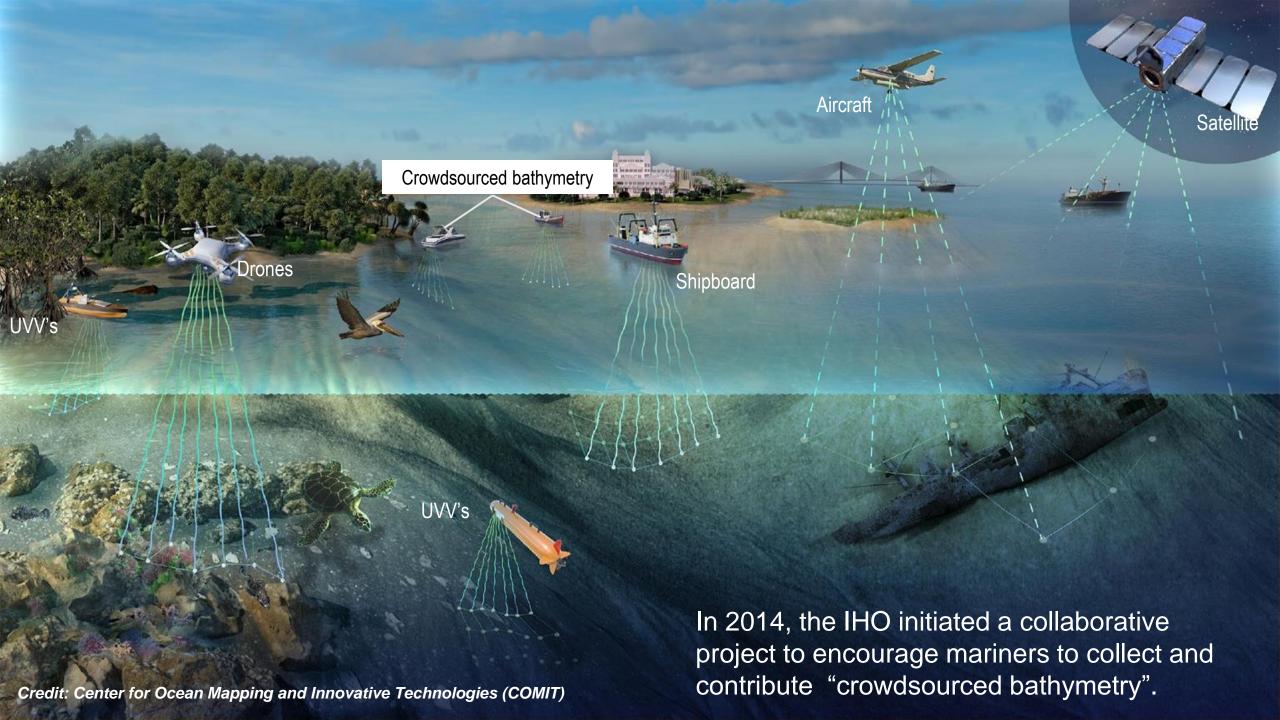


Meso American & Caribbean Sea Hydrographic Commission (MACHC) - MACHC 25



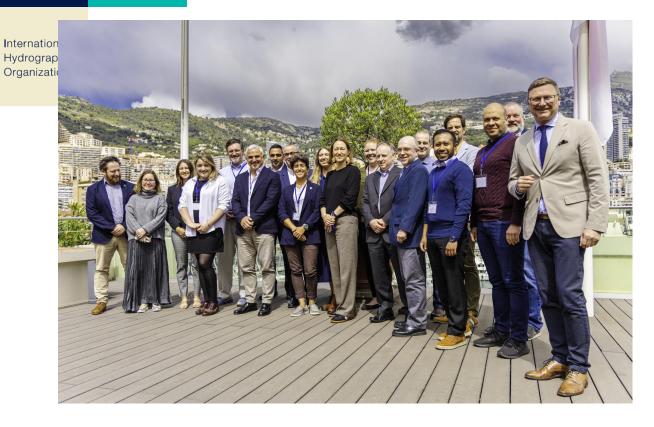
Crowdsourced Bathymetry

CSB Supporting Hydrographic Offices



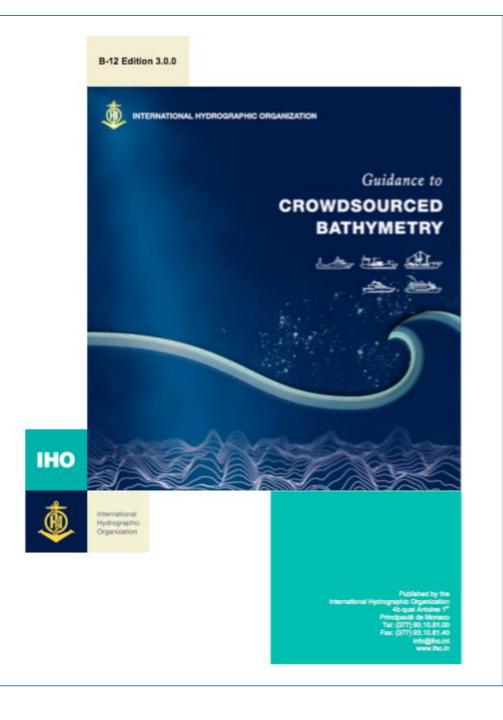


IHO Crowdsourced Bathymetry Working Group



CSBWG15 - Monaco

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





National Policy

International Hydrographic Organization

> Coastal states were requested by the IHO to indicate their position on the public sharing of CSB data collected within waters subject to their national jurisdiction.

To date, 37 coastal states (green) have replied positively to IHO CL 21/2020 & IRCC CL 1/2020





IHO Circular Letter 21/2020 & IRCC Circular Letter 1/2020

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 national jurisdiction into the public domain as well as highlighting ...any caveats they wish to apply to such provision."

*The UK signed in October 2024!

MACHC IHO Member States:

Brazil, Colombia, Cuba, Dominican Republic,
France, Guatemala, Guyana, Jamaica, Mexico,
Netherlands, Suriname, Trinidad and Tobago,
United Kingdom*, United States of America,
Venezuela.

MACHC Associate States:

Antigua and Barbuda, Barbados, Belize, **Costa Rica**, El Salvador, Grenada, Haiti, Honduras, Nicaragua, Panama, Saint Lucia, St Kitts and Nevis, St. Vincent and the Grenadines.

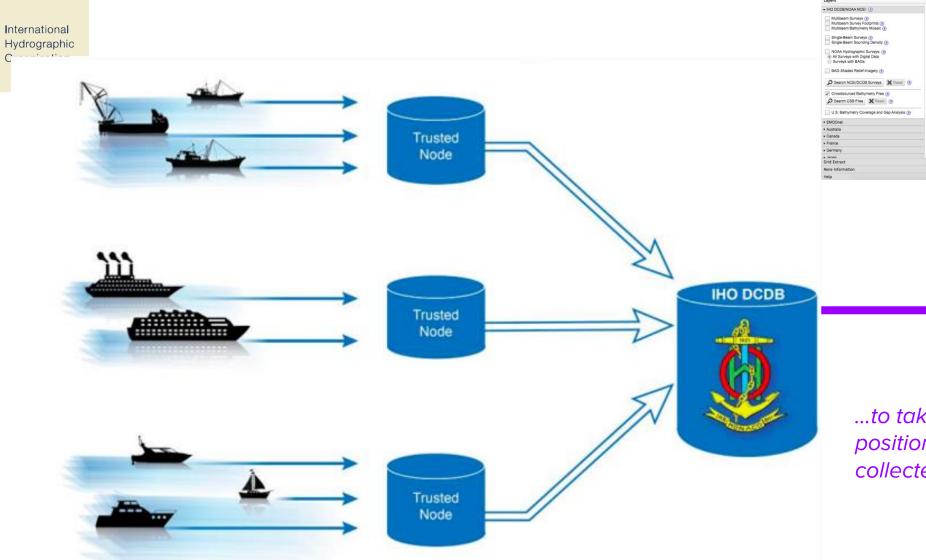
MACHC Observer States: Dominica, Spain

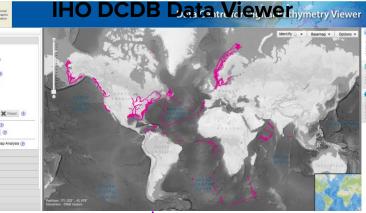
The IHO encourages all member States to review IHO CL 21/2020 and, if possible, offer a positive response to IHO Secretariat.

iho.int/uploads/user/circular_letters/eng_2020/CL21_2020_EN_v1.pdf iho.int/uploads/user/circular_letters/esp_2020/CL21_2020_ES_v0.1.pdf



IHO CSB Data Flow





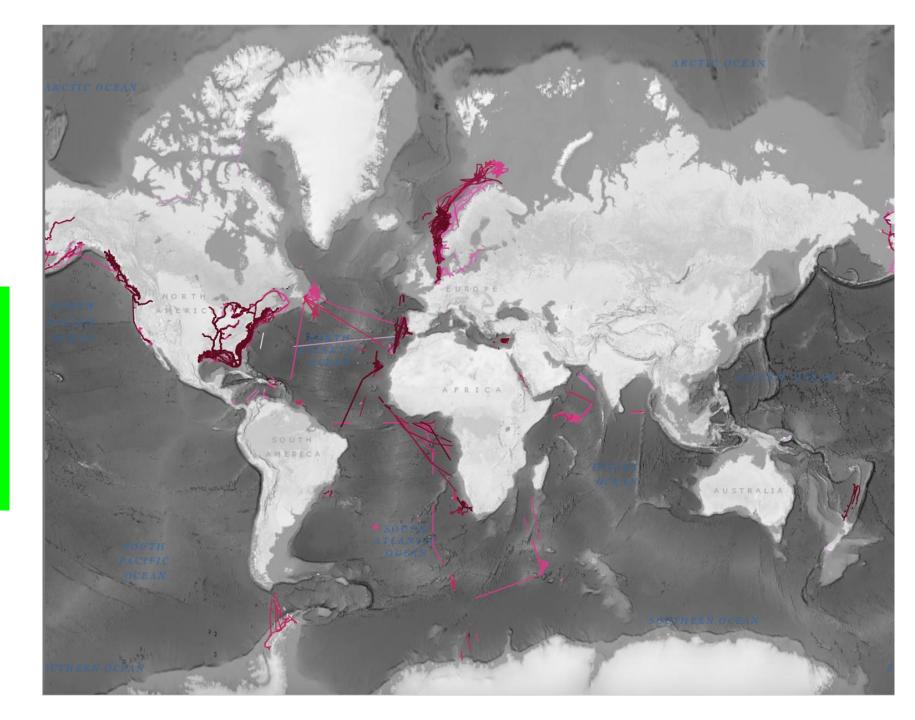
Geographic Filter Applied ...to take into account coastal States" positions on the distribution of CSB collected in their areas of jurisdiction.



International Hydrographic Organization

> 31.5 GB of CSB data, contributed from 369 vessels, are publicly accessible.

In November the DCDB exceeded 1.25 billion data points.





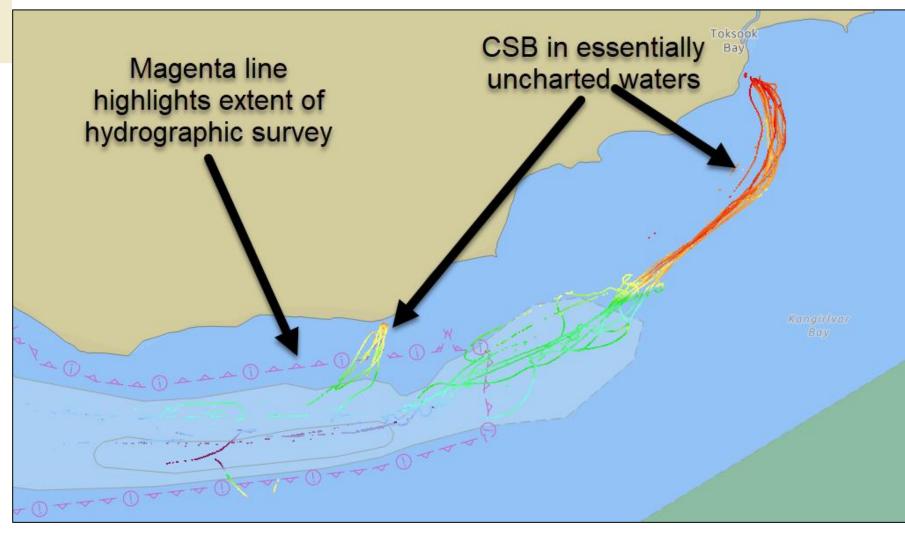
International Hydrographic Organization

HOW CSB DATA IS BEING USED



Filling gaps where data is scarce

International Hydrographic Organization

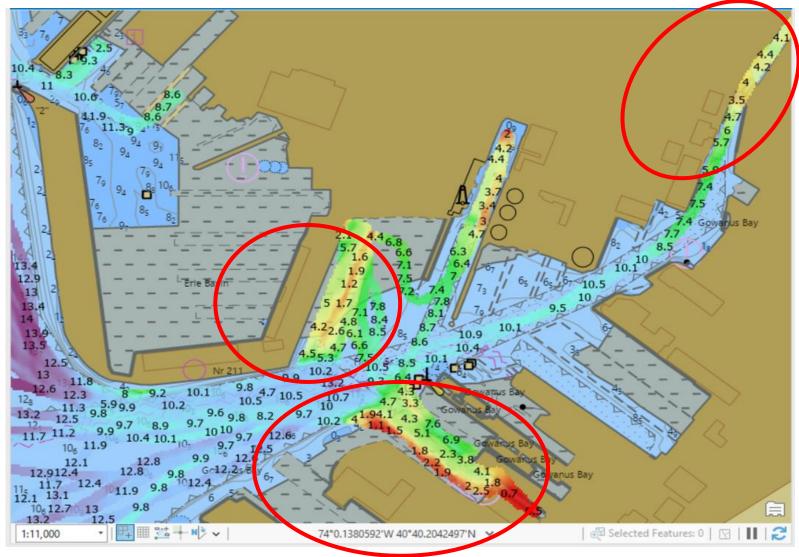


CSB tracks collected through and past the extent of a NOAA hydrographic survey in Toksook Bay, Alaska.



Filling gaps where mariners navigate

International Hydrographic Organization

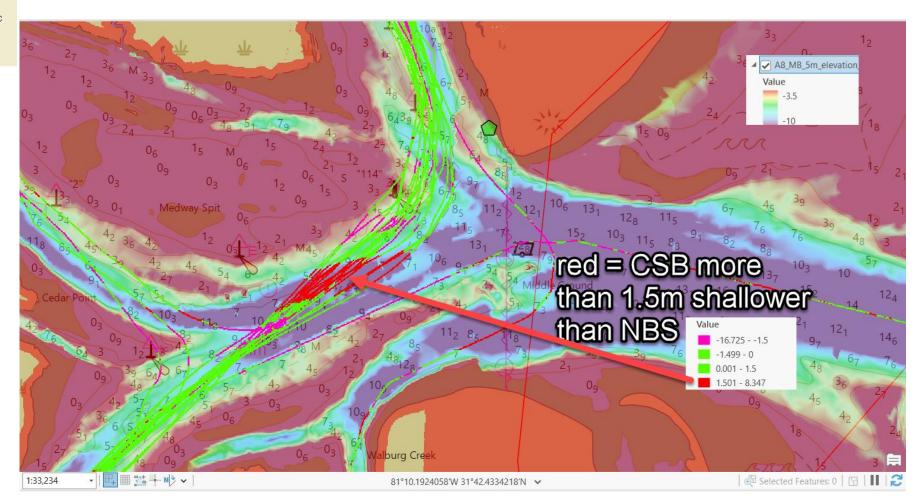


Brooklyn New York; Credit: NOAA



Discrepancy Modelling

International Hydrographic Organization

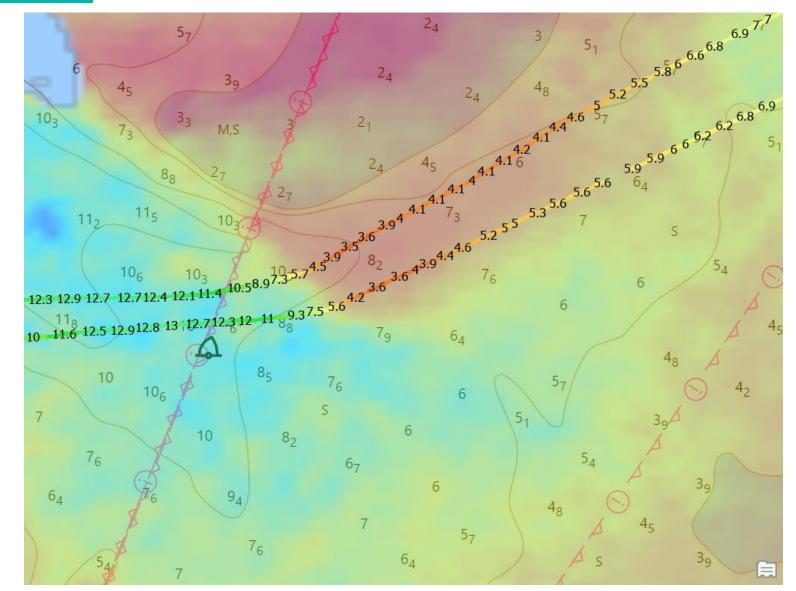


Detecting coastal change over time and discrepancies in underlying bathymetric model.



SDB correlation and ground truthing

International Hydrographic Organization



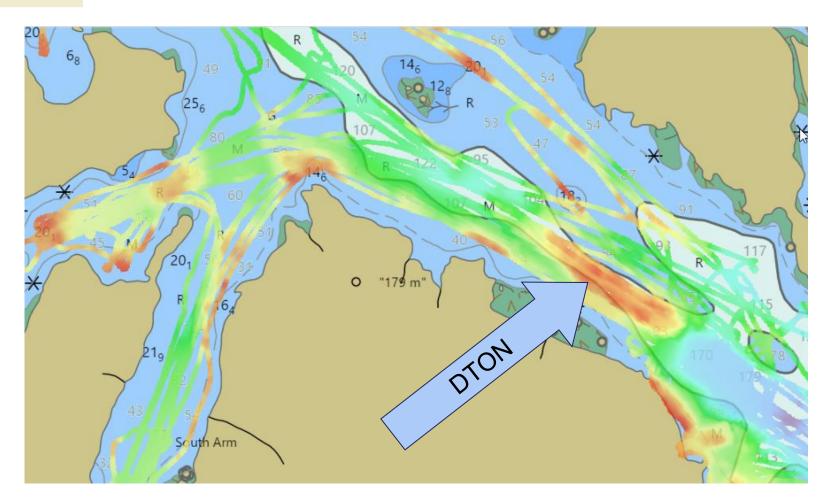
CSB detected and SDB confirmed shift of Nautilus Shoal in mouth of Chesapeake Bay

Credit: NOAA



IHO *Detecting <u>Dangers to Navigation</u> before deploying field hydrographers*

International Hydrographic Organization

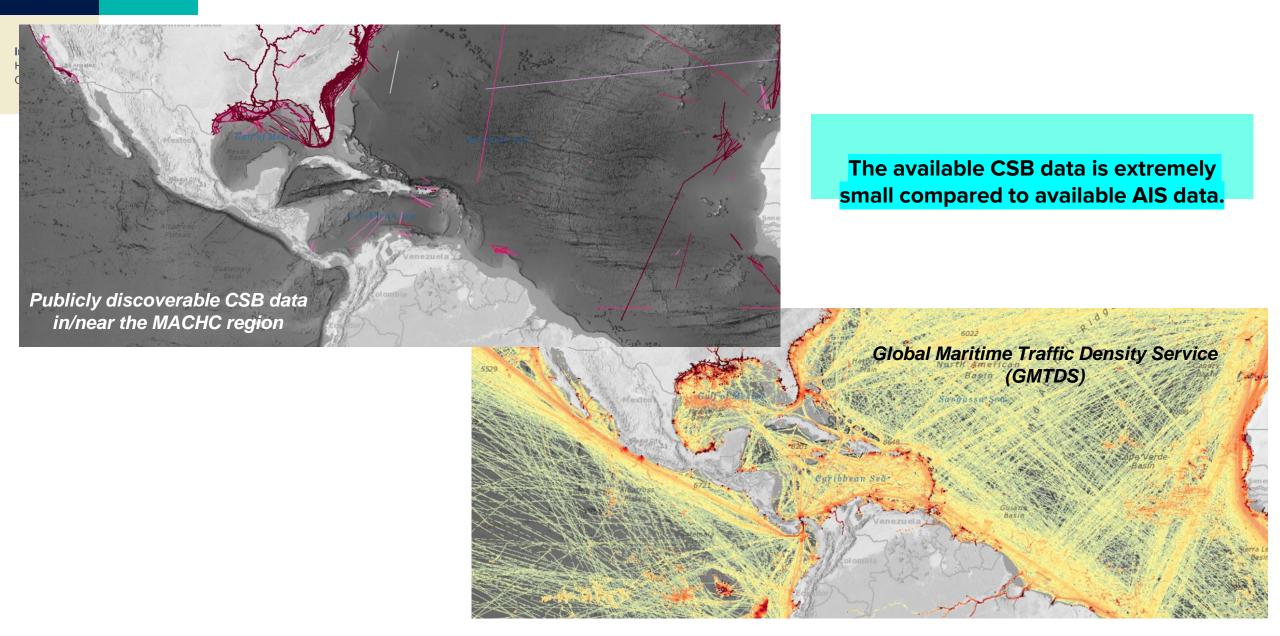


Fairweather 2023 Dixon Entrance Project - CSB identified over half of fieldsubmitted DTONs ahead of time

Credit: NOAA



The Value of CSB Data could be SO much greater





International Hydrographic Organization

CSB TOOLS & RESOURCES

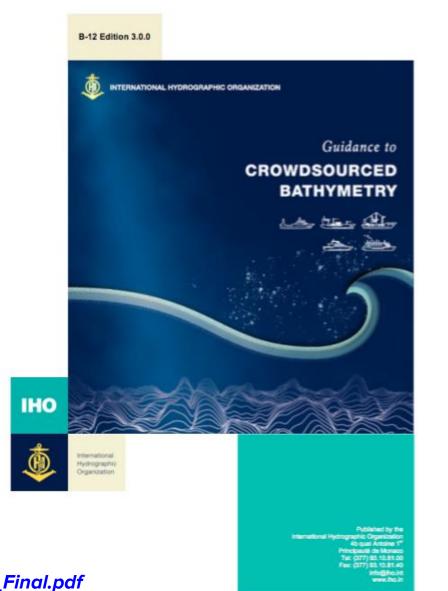
CURRENT & UNDER DEVELOPMENT



B-12 IHO Guidance on Crowdsourced Bathymetry

International Hydrographic 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



CSB User Tools - Open Source

International Hydrographic Organization



Home What

What is CSB? Te

Technology Partners Get Involved

CIDCO Open Source

The Wireless Inexpensive Bathymetry Logger (WIBL) project

The WIBL project aims to provide a minimally functional end-to-end hardware/firmware/cloud software environment for collecting CSB data.

Read more

CSBSchema

The project includes software to validate files against the B-12 json format.

Read more

OpenVBI

The OpenVBI project aims to gather together a collection of community-vetted algorithms for all aspects of the processing of volunteer data.

Read more

VBICompare

The VBICompare project provides tools to interact with the DCDB archive of CSB data.

Read more

NOAA CSB Processing Chain

This project provides guidance on NOAA's developing pipeline for CSB data processing, including water level and vertical offset corrections, filtering, and product construction.

Read more

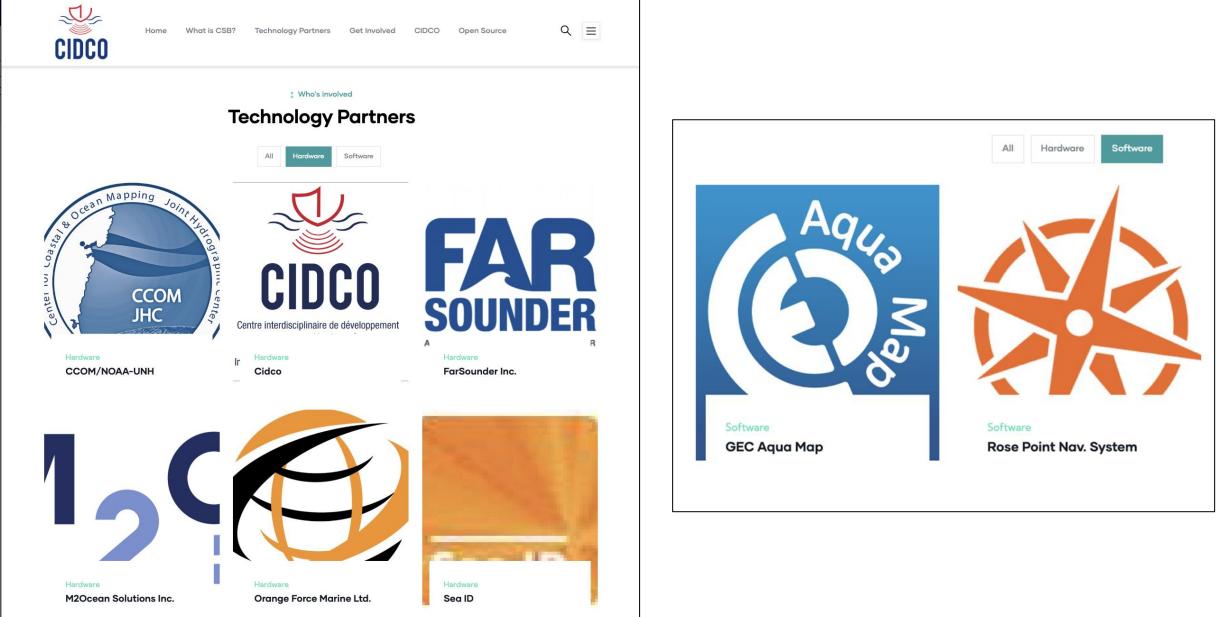
openbathymetry.cidco.ca/open-source

Q

Ξ



CSB User Tools - Hardware & Software



openbathymetry.cidco.ca/open-source



YOUR MACHC 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!





Workshop on CSB

Organized a CSB Workshop (26 Apr 2024)

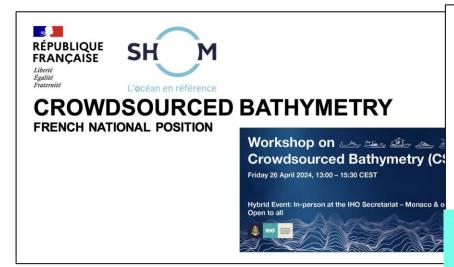
- 107 participants from over 50 coastal States
- Active engagement with over a dozen questions posed, time to provide adequate answers, and positive feedback provided during the event and afterwards
- Several MSs have since reached out reiterating the value of this type of engagement and highlighting that previous modes of communications around the various aspects of CSB had not always been clear.

Workshop on Crowdsourced Bathymetry (CSB)



Crowdsourced Bathymetry (CSB) : Legal Considerations & Misconceptions Inter Regional Coordination Committee Workshop on CSB IHO Headquarters, Monaco

Steven G. Keating, United States Observer to the Advisory Board on the Law of the Sea





Recording & Slides available: iho.int/en/csbwg-ircc-workshop-2024



The Utility of Crowdsourced Bathymetry Data A NOAA Perspective

Anthony Klemm, NOAA Coast Survey Development Lab 26 April 2024



CSB Working Group

Current Representation from Member States: Argentina, Canada, China, Denmark, France, Germany, India, Iran, Italy, Jamaica, Lebanon, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, South Africa, Sri Lanka, Sweden, UK, Uruguay, USA

Observers and expert contributors: CCOM-JHC, CIDCO, CIRES, COMIT, Da Gama Maritime Ltd, Dongseo U, Dock Tech, ECC AS, ESRI, FarSounder, FLIR Systems AB, Fugro, GMATEK, Inc., Great Lakes Observing System (GLOS), H2i, Inkfish, International Seakeepers, 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



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 - 26-28 March 2025, New Zealand (NIWA/LINZ)



International Hydrographic Organization

CSB TOOLS WORKSHOP

24-25 March 2025 (preceding CSBWG16)

The CSBWG will host a workshop where participants could learn about and see examples on how to use available CSB tools from all aspects of the CSB data cycle. Developers would provide assistance with first attempts to use these tools while also gathering user feedback.

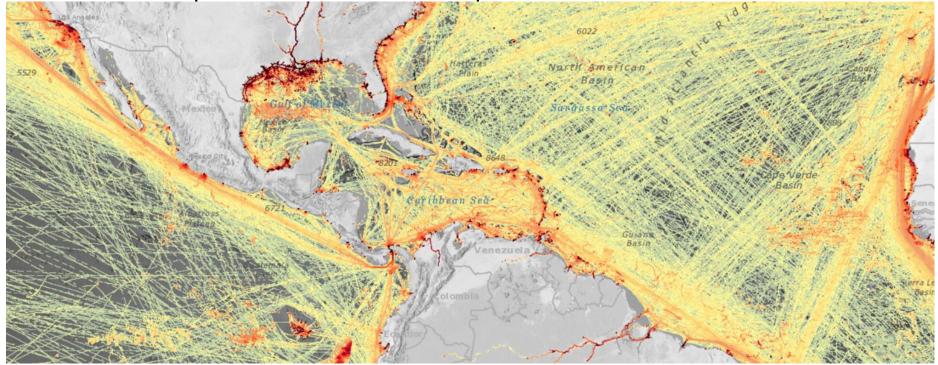
All Hydrographic Offices are encouraged to participate & attend.



The MACHC is requested to:

International Hydrographic Organization

- Actively support the adoption, contribution, publicization, and use of CSB data within this region
- Follow the latest developments of the CSBWG
- Take ownership of these data and their potential uses!



Global Maritime Traffic Density Service (GMTDS)



The Nippon Foundation - GEBCO Seabed 2030 Project

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.

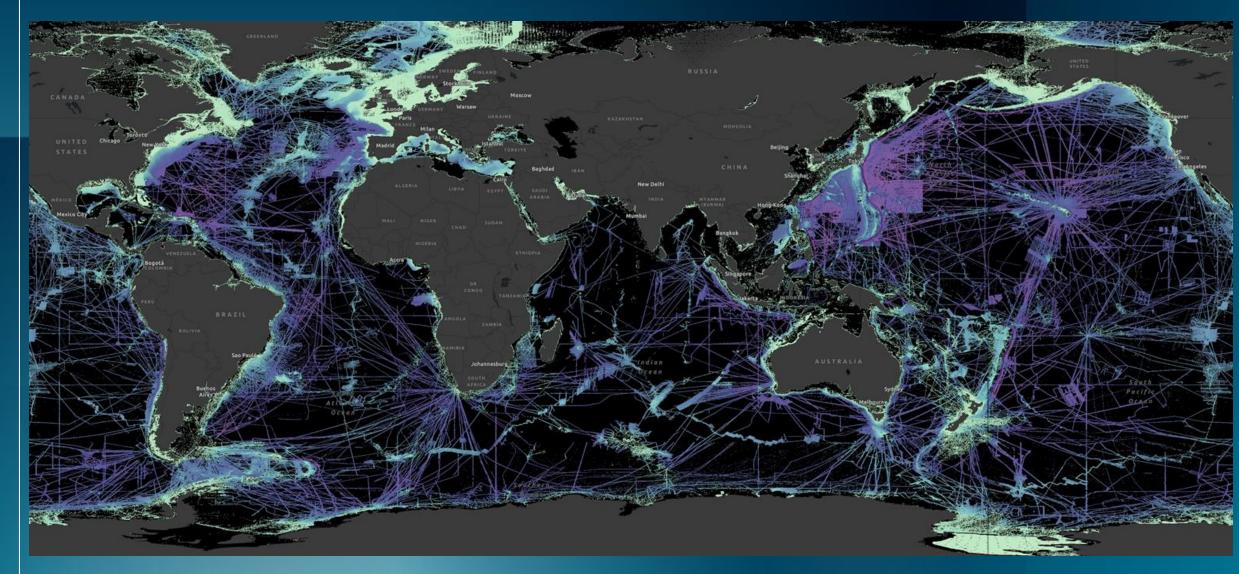
Seabed 2030 aspires to empower the world to make policy decisions, use the ocean sustainably, and undertake scientific research that is informed by a detailed understanding of the global ocean floor.





Status of Mapping

SEABED



26.2 % of the world ocean mapped with direct measurements (GEBCO 2024)

A regional approach



Global Center (GDACC)

- Assemble global products
- Disseminate global products

Regional Centers (RDACCs)

- Engage with stakeholders
- Build upon existing efforts
- Assemble regional products
- o Identify gaps

LAMONT-DOHERTY EARTH OBSERVATORY







University of New Hampshire



National Oceanography Centre NATURAL ENVIRONMENT RESEARCH COUNCIL



- Engage with stakeholders 0
- Assemble regional products 0
- Identify gaps in data coverage 0
- Provide technical guidance and assistance 0

atlantic-Indian@seabed2030.org



Vicki Ferrini, PhD Center Head





Frank Nitsche, PhD **Research Scientist**



Tinah Martin Lead Data Manager, Indian Ocean





Hayley Drennon Lead Data Manager, Atlantic Ocean





Sheila Caceres Data Manager





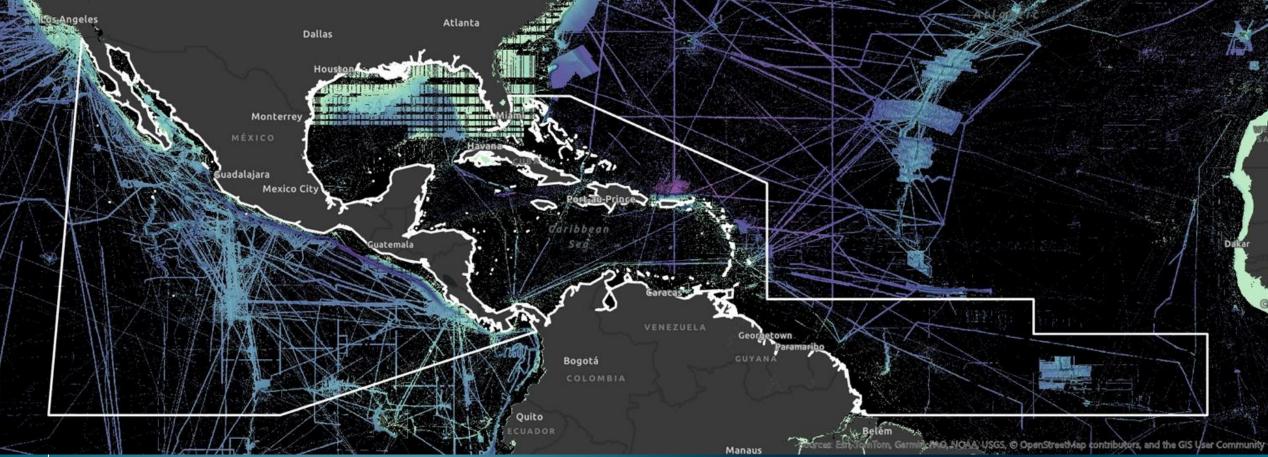
LAMONT-DOHERTY EARTH OBSERVATORY



Developer



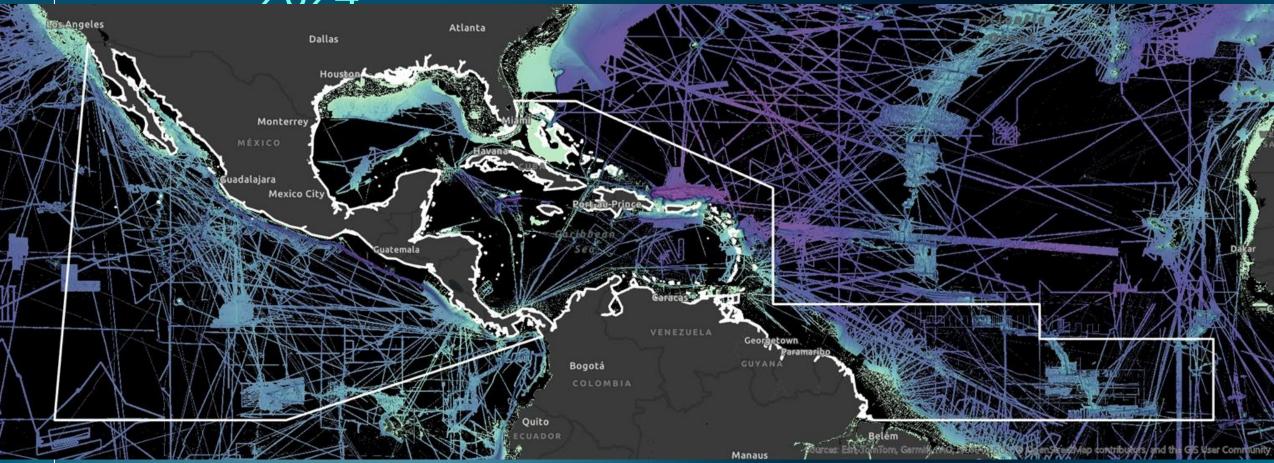
Status of Mapping within the MACHC 2014



Status of Mapping within the MACHC 2024

SEABED

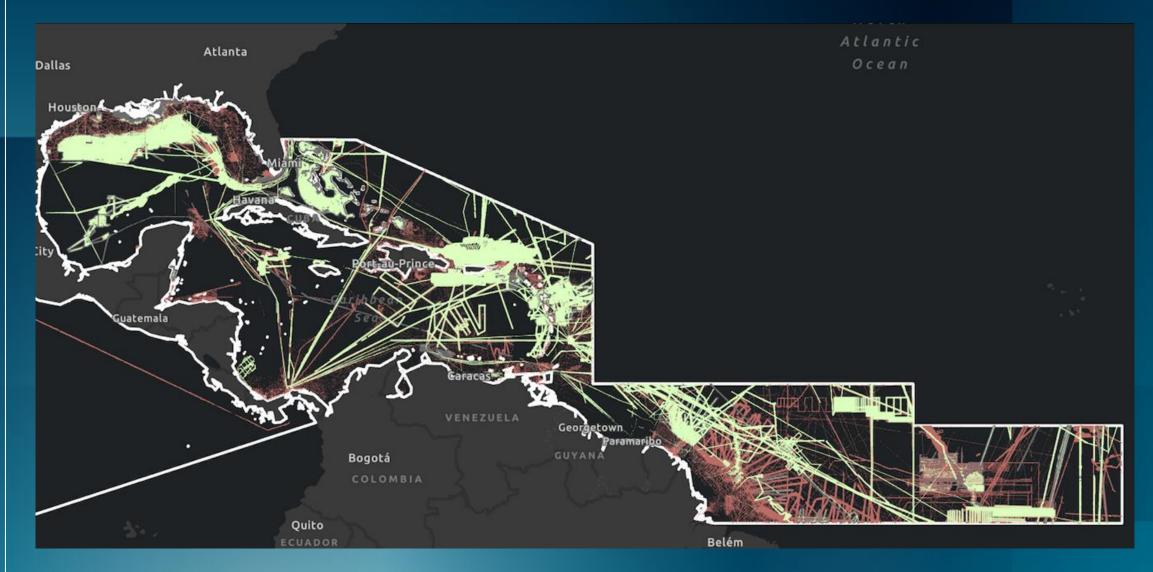
29.32% mapped



Data Diversity Within the MACHC Region



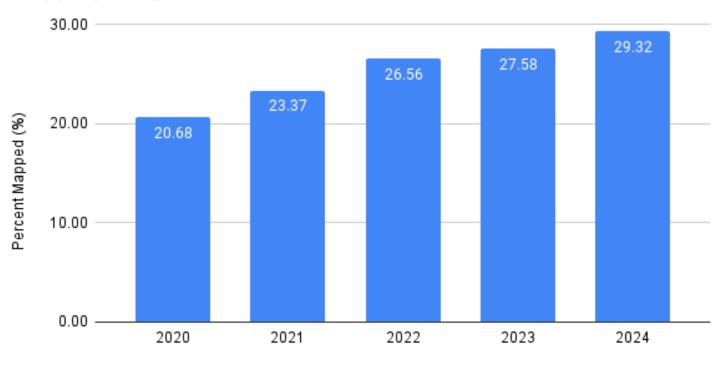
Data Publicly Available Within the MACHC Region



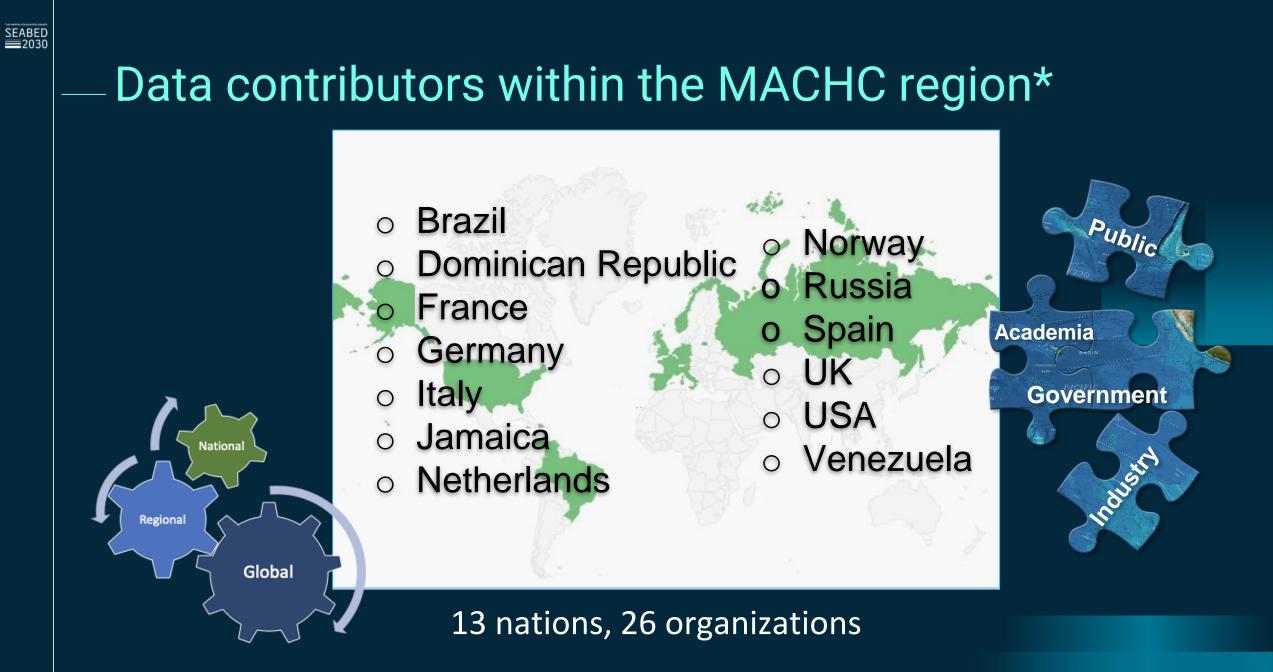
Mapping Progress within the MACHC

MACHC: 29.32% mapped (GEBCO 2024)

Mapping Progress MACHC



GEBCO Release



*only reflective of contributors within the AIORC region



Resources: Data Submission Guidelines

SEABED Submission 2030 Guidelines

Data Access

If the data is available on a website, please provide the URL to access it directly in the data submission form.

Type of Data

If you are providing gridded data, please include details about the types of data within the grid and explain the distribution of the underlying data used to generate it. This will help us create the Type Identifying (TID) grid. More info here: https://bit.ly/478batK

0=

Metadata

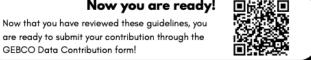
are ready to submit your contribution through the

IHO

GEBCO Data Contribution form!

When submitting data, it's crucial to include the geographic coordinate system, data units, and vertical reference information if available. Please also provide details on who should be credited for the data contribution.

Now you are ready!



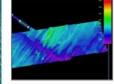
What to Contribute?

The Seabed 2030 Team can work with multiple formats and types of data files that contain bathymetric measurements.

Types of Data

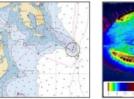
Singlebeam





Electronical Nautical Charts (ENCs)

Satellite Derived Bathymetry (SDB)



Learn more in the "Types of Data" section of our TID StoryMap: https://bit.lv/478batk

Common Formats

- Raster data (e.g. NetCDF, GeoTIFF, BAG)
- Swath-formats (e.g. Shapefiles (SHP) *.all, *s7k, *gsf)

1 6

unesco

- ASCII/XYZ Files
- · And more ...!

SEABED

2030

Seismic

LIDAR

SEABED para el envío 2030 de datos Acceso de dato Si los datos están disponibles en una página wel cionar la URL para acceder a los rmulario de envío de datos. Guide de SEABED soumission ïpos de da obre los tipos de d 2030 de données la distribución de la enerar la grilla. Es Accès aux donnée Metadatos Si les données sont disponibles sur un site web, veuil E ournir le lien d'accès directement dans le A enviar datos, e ordenadas aena avor también de pr Type de données le debe atribuir el m des détails sur les types de données dans la grille et expliquer la distribution des données sous-ja Ahora está es pour les générer. Cela nous aidera à créer grille d'identification du type de données (TIL Plus d'infos ici 👼 ІНО --d'inclure le système de coordonnées géographiqu □=(~ les unités de données et la référence verticale disponible. Veuillez fournir des détails sur le --personnes qui devraient être créditées pour tribution des donnée unesco ⊘

Available in English, Spanish & French!





https://seabed2030.org/2024/09/10/data-submission-guidelines/



Resources: What is TID?

The GEBCO Type Identifier (TID) grid allows us to see which type of data was used to populate each cell of the GEBCO grid. More on this on our TID StoryMap! Where we explore this concept, why it exists and how it is used.

tanding TID

Understanding TID

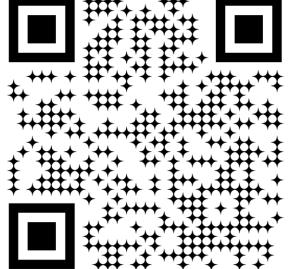
This StoryMap explores the concept of the GEBCO Type Identifier (TID), why it exists and how it is used

Atlantic and Indian Oceans Regional Center, Nippon Foundation - GEBCO Seabed 2030 Project April 16, 2024

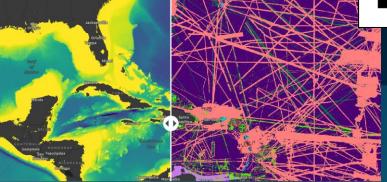
apped Seabed 2030 Types of Data Type Identifier (TID) GEBCO TID Grid How TID is Important to Data C... Example 1: No TID infor

GEBCO TID Grid

The TID grid allows us to see which type of data was used to populate each cell of the GEBCO grid. In this example, we can see both the seabed depth in the Caribbean, and we can swipe the slide bar to see the types of data sources that were assembled [See Legend].



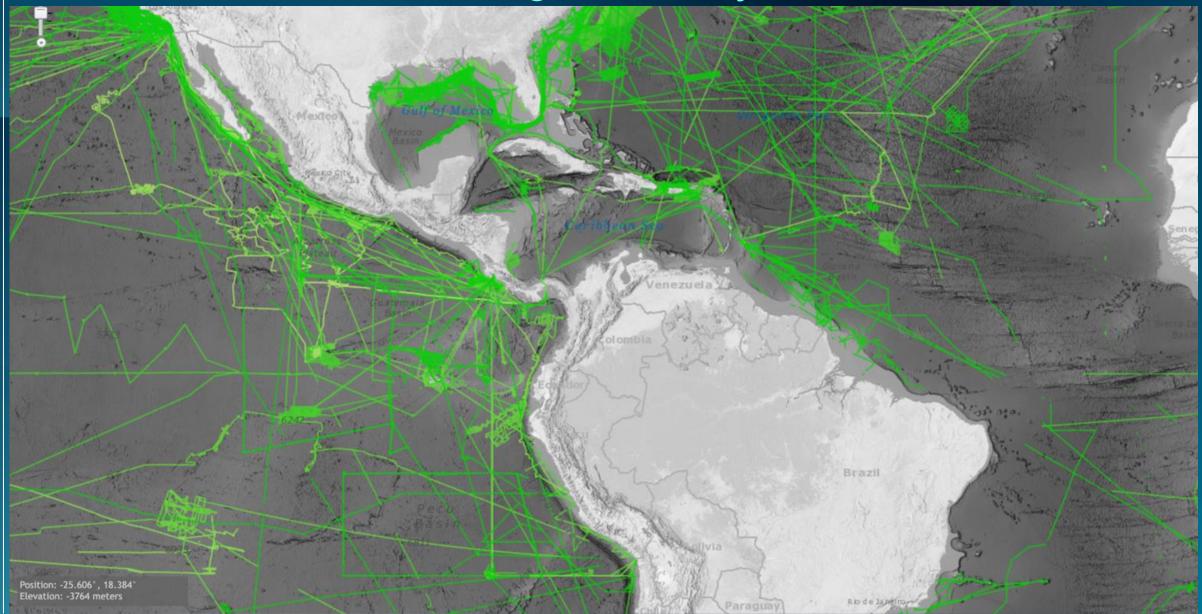
https://arcg.is/04yS9r0



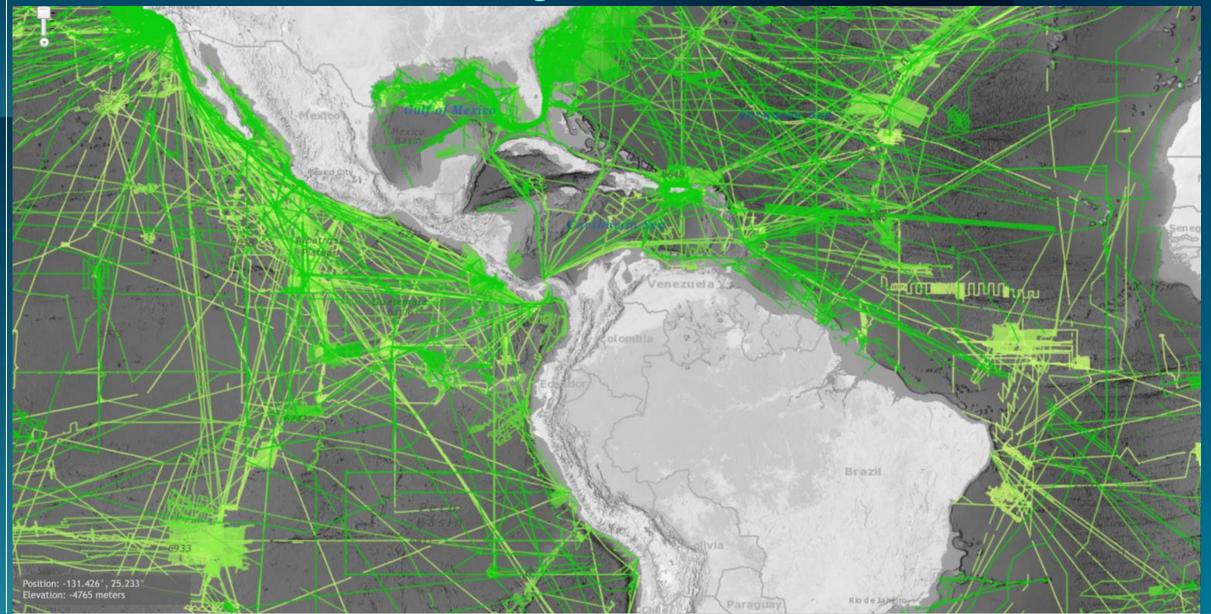
DCDB Multibeam Holdings January 2019

SEABED

37



DCDB Multibeam Holdings Nov 2024



SEABED

Regional Community Meetings

Virtual Meeting: January 14 -16, 2025

- Updates on mapping status within the region
- Technical session
- Regional Mapping Community initiatives and updates

Scan the QR code to express your interest in joining!

Or contact the center at: <u>atlantic-indian@seabed2030.org</u>

In-person events planned for later in the year!



SEABED



GET INVOLVED

Everyone with a link to the ocean can play a powerful role in helping to map the entire seafloor by the end of the decade.

CONTRIBUTE DATA

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

in



CONTACT US

Book a video call during our office hours

The Atlantic and Indian Oceans Regional Center Team is here to assist with your bathymetric data inquiries!

BOOK A CALL

atlantic-indian@seabed2030.org

Contact us for:

- Technical assistance (data access, data contribution)
- Guidance regarding bathymetry data question
- Capacity Development and Workshop planning

THE NIPPON FOUNDATION-GEBCO



THANK YOU

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



UNITED WE DISCOVER



IHO Data Centre for Digital Bathymetry





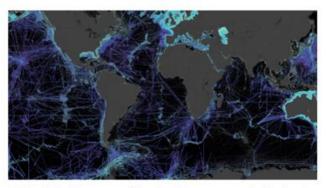
Home Products Services Resources News Contact About

Home / IHO Data Centre for Digital Bathymetry (DCDB)

IHO Data Centre for Digital Bathymetry (DCDB)

The International Hydrographic Organization (IHO)
Data Centre for Digital Bathymetry (DCDB) was established in 1990 to steward the global collection of bathymetric data. The Centre archives and shares, freely and without restrictions, depth data contributed by mariners and other stakeholders consistent with IHO direction and guidance. The IHO DCDB is hosted by the U.S. National Oceanic and Atmospheric Administration (NOAA) on behalf of the IHO Member States.

The DCDB archive includes over 70 terabytes (uncompressed) of oceanic depth soundings acquired with multibeam and single beam sonars by hydrographic, oceanographic and industry vessels during surveys or while on passage.



25% of the deep ocean floor has been mapped with direct measurement and approximately 50% of the world's coastal waters remain unsurveyed. (Source: GEBCO)

About

Crowdsourced Bathymetry



Multi/Singlebeam Bathymetry

Crowdsourced Bathymetry

Bathymetric Data

About

The DCDB archive includes over 70 terabytes (uncompressed) of oceanic depth soundings acquired with multibeam and single beam sonars by hydrographic, oceanographic and industry vessels during surveys or while on passage.

How to Contribute Data to the IHO DCDB

Contact <u>bathydata@iho.int</u> for more information on contributing data or sharing web services to the IHO DCDB. The DCDB accepts submissions from government, academic, industrial, and research organizations, as well as individual researchers.

Data Submission and Packaging Instructions

Bathymetric data and metadata can be submitted via File Transfer Protocol (FTP), email, or mail (hard drive) in the formats listed below.

- Raw sonar data: native sensor format
- Processed data: gsf, BAG, NetCDF, tiff, xyz, sd, asc, etc.
- Metadata: XML or text

Other formats and products will be considered on a case-by-case basis.

CruisePack Software

CruisePack is a data packaging and metadata gathering software tool that simplifies the collection and submission process for cruise-based data.

CruisePack Download Instructions

ncei.noaa.gov/iho-data-centre-digital-bathymetry



International Hydrographic Organization About Multi/Singlebeam Bathymetry

IHO Crowdsourced Bathymetry Initiative

The IHO defines crowdsourced bathymetry (CSB) as depth measurements collected and contributed by vessels, using standard

navigation instruments, while engage

In 2014, the IHO recognized that trac there was a need to encourage and s enable mariners and professionally collected on vessels with common of supplement the more rigorous and s world.

Contribute CSB Data

Access CSB Data

IHO Guidance on

The <u>IHO's Crowdsourced Bathymetr</u> hydrographic experts, was tasked by data loggers, preferred data formats

The guidance document also provid uncertainty and accuracy issues with

B-12 Edition 3.0 IHO Guidance Docu

Contribute (CSB Data
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Access CSB Data

Interactive Map/Data Viewers

Download CSV or GeoJSON files, including full metadata as contributed, via the <u>IHO DCDB Viewer</u> or <u>NOAA's Bathymetric Data</u> <u>Viewer</u>. The package is delivered as a gzipped tar file with the contents nested in directories several levels deep.

API

Download soundings using the <u>CSB Data Extract API</u> . This API can be called directly or by using the <u>DCDB map viewer</u> for a more human-friendly experience. The soundings can also be requested as a gridded product with a specified resolution.

Cloud Access

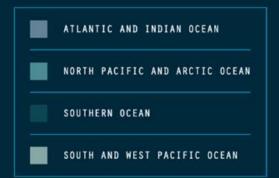
Download CSV-format files directly from the AWS S3 bucket hosted by the <u>NOAA Open Data Dissemination Program</u>. Users can review the <u>registry of open data</u>, <u>browse data in the bucket</u> and download individual files, or use AWS-provided and third-party tools and SDKs for programmatic access.

Note: CSV files downloaded from the S3 bucket only contain UniqueID, File_UUID, lon, lat, depth, time, platform name, provider attributes and that full metadata is not provided.

Additional information can be found in the Crowdsourced Bathymetry Frequently Asked Questions d.



The IHO Data Center for Digital Bathymetry is the central repository for raw bathymetric data and all data compiled by Seabed 2030 and is hosted by the US National Oceanic and Atmospheric Administration (NOAA) in Boulder, Colorado. The DCDB archives and freely shares depth data acquired by vessels during surveys or while on passage.





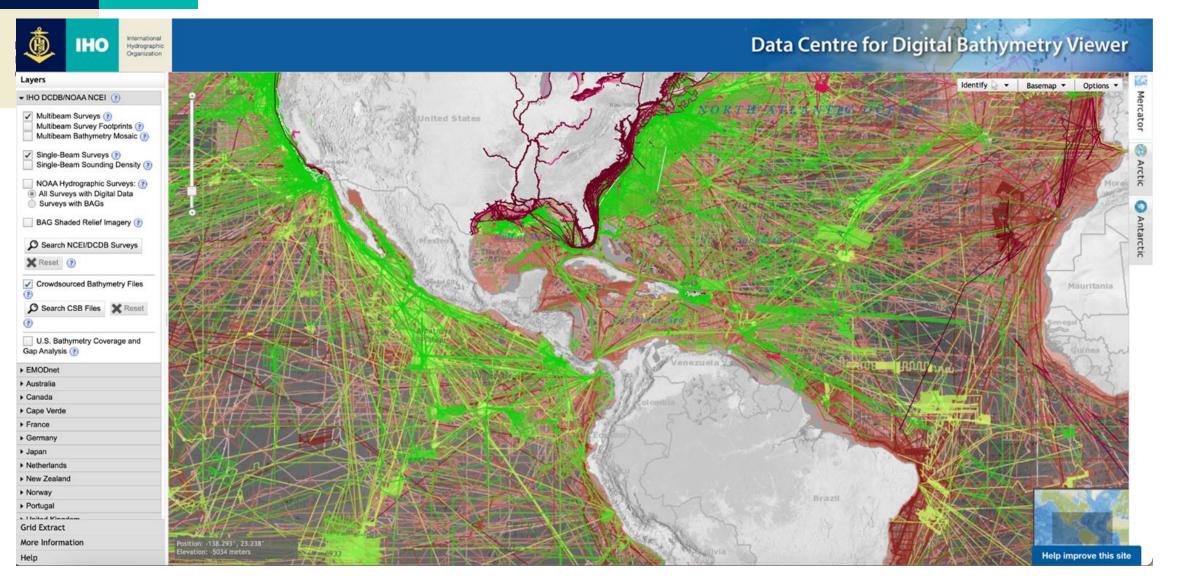


International Hydrographic Organization

DATA HOLDINGS



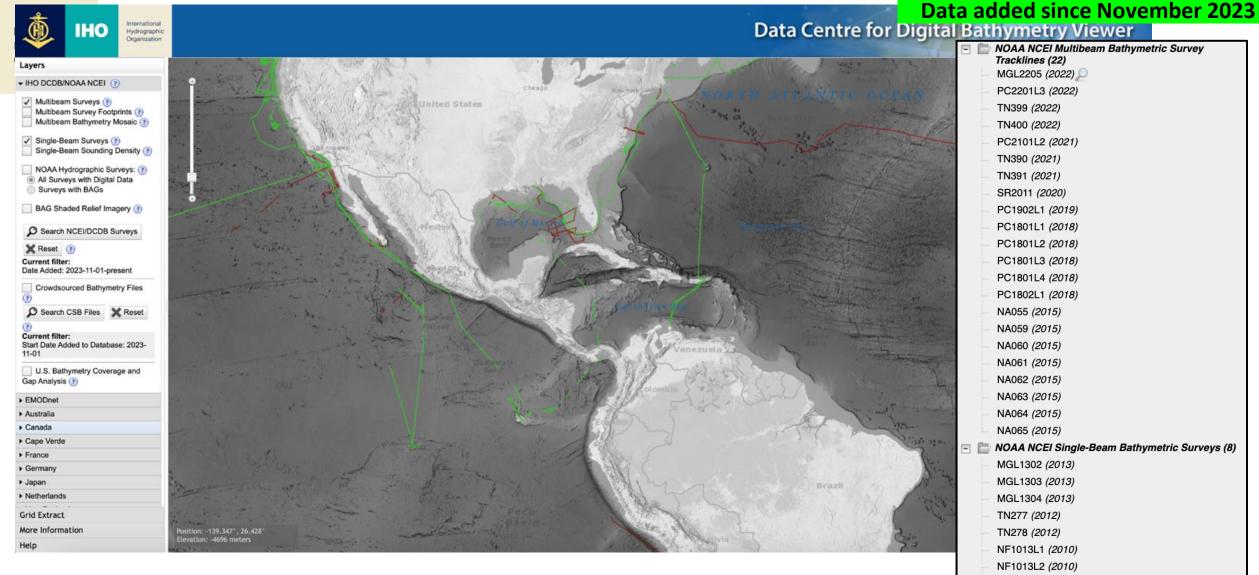
The World Reference for Raw Bathymetry



ncei.noaa.gov/maps/iho_dcdb



Newly Added Multibeam and Singlebeam Surveys



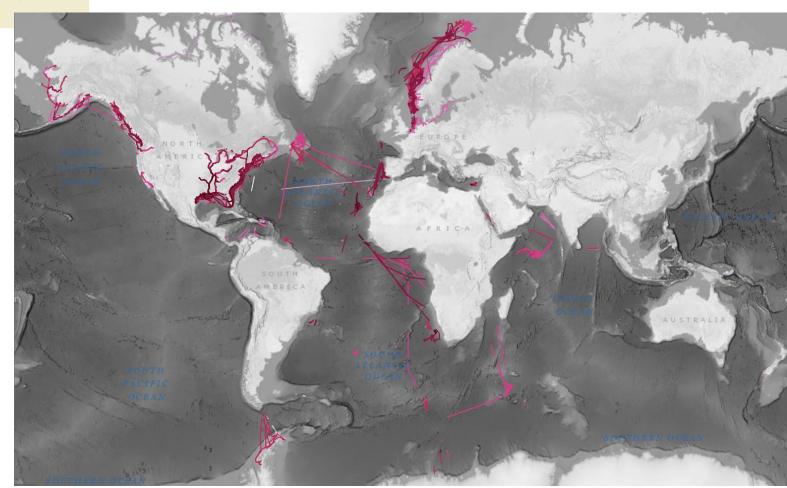
ncei.noaa.gov/maps/iho_dcdb

SANQ01RR (2005)



IHO DCDB Data Holdings - Crowdsourced Bathymetry Data Contributions: TODAY

International Hydrographic Organization



- Rosepoint Navigation Systems
- FarSounder Inc.
- MacGregor Germany/Carnival Cruise Line
- Petroleum Geo-Services (PGS)
- M2Ocean
- Great Lakes Observing System (GLOS)
- Orange Force Marine
- GEC Aqua Map
- Seabed 2030
- International SeaKeepers
- COMIT
- Onboarding in process for: The Interdisciplinary Center for Development in Ocean Mapping (CIDCO), UNH/CCOM, SeaID, and NOAA.



IHO

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IHO

International

Hydrographic Organization

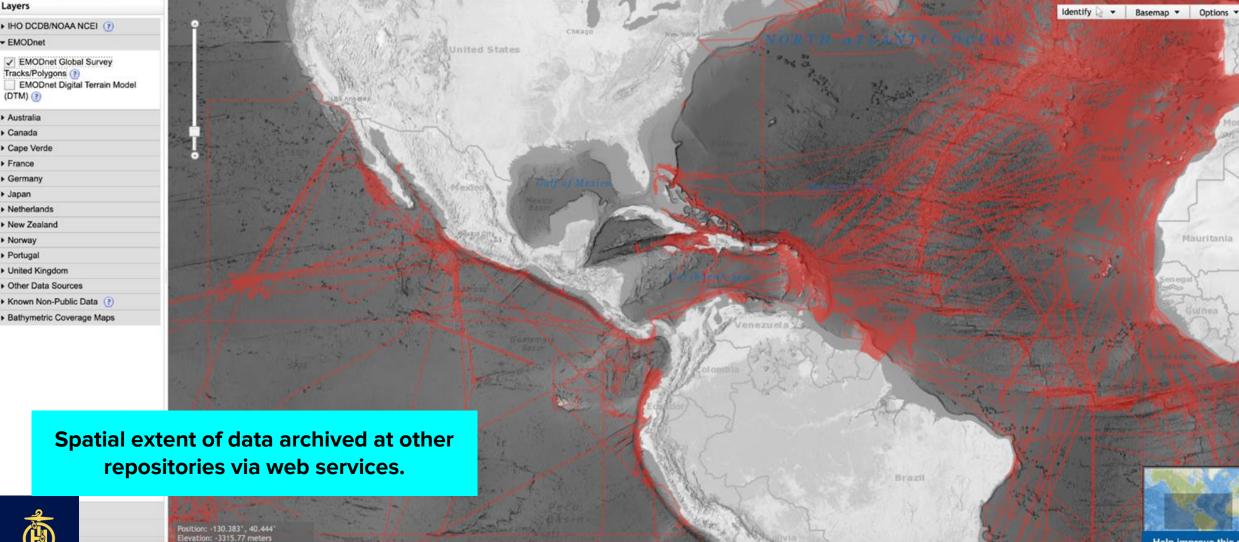
DCDB Web Services - EMODnet

Data Centre for Digital Bathymetry Viewer

rcator

Antarctic

Help improve this site







IHO

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Layers

EMODnet Australia Canada Cape Verde - France

Germany Japan Netherlands

New Zealand Norway Portugal

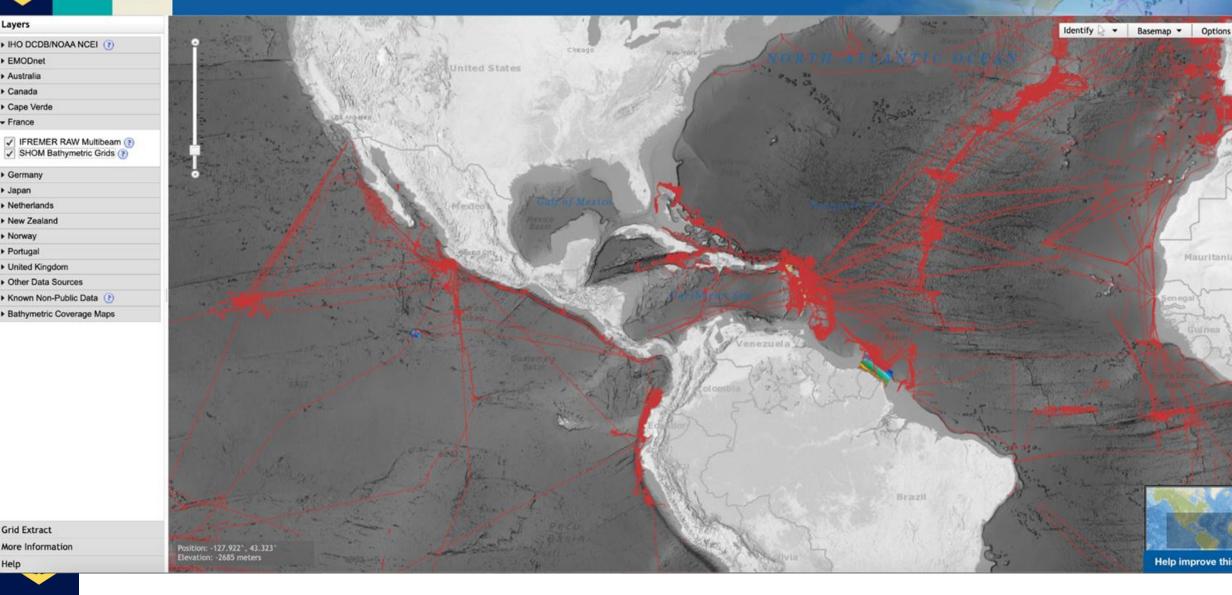
 United Kingdom Other Data Sources IHO

International

Hydrographic Organization

DCDB Web Services - France

Data Centre for Digital Bathymetry Viewer



Grid Extract More Information Help

Help improve this site

irctic

Mauritanla



Layers

EMODnet Australia Canada Cape Verde France - Germany

Coverages (?)

Footprints (?)

Bathymetry (?)

Japan Netherlands New Zealand Norway Portugal

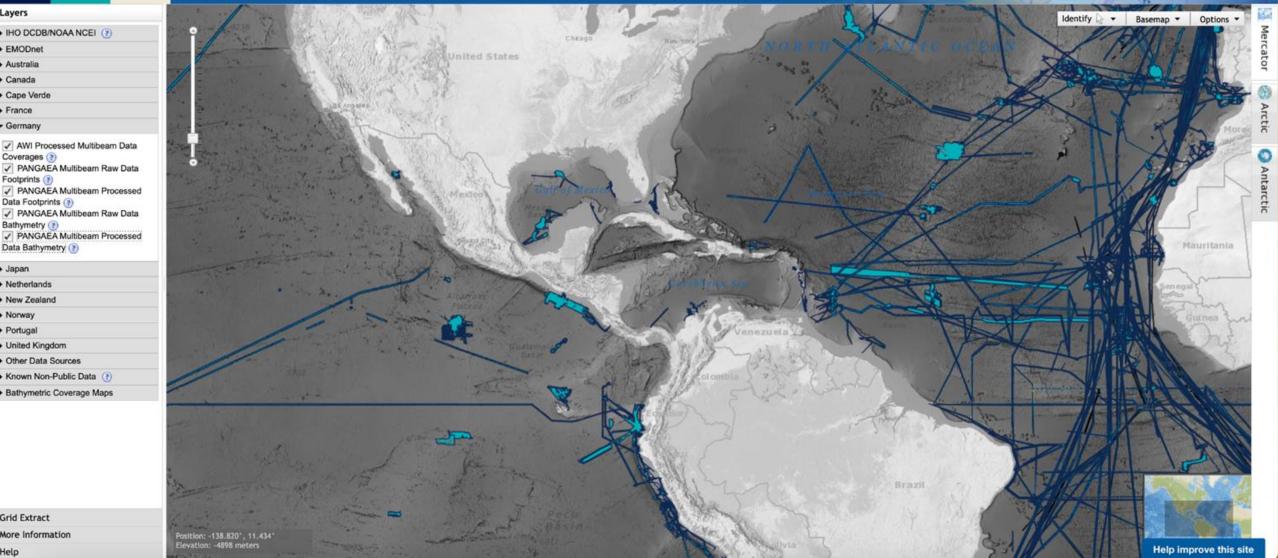
IHO

International

Hydrographic Organization

DCDB Web Services - Germany

Data Centre for Digital Bathymetry Viewer



Grid Extract More Information Help



IHO

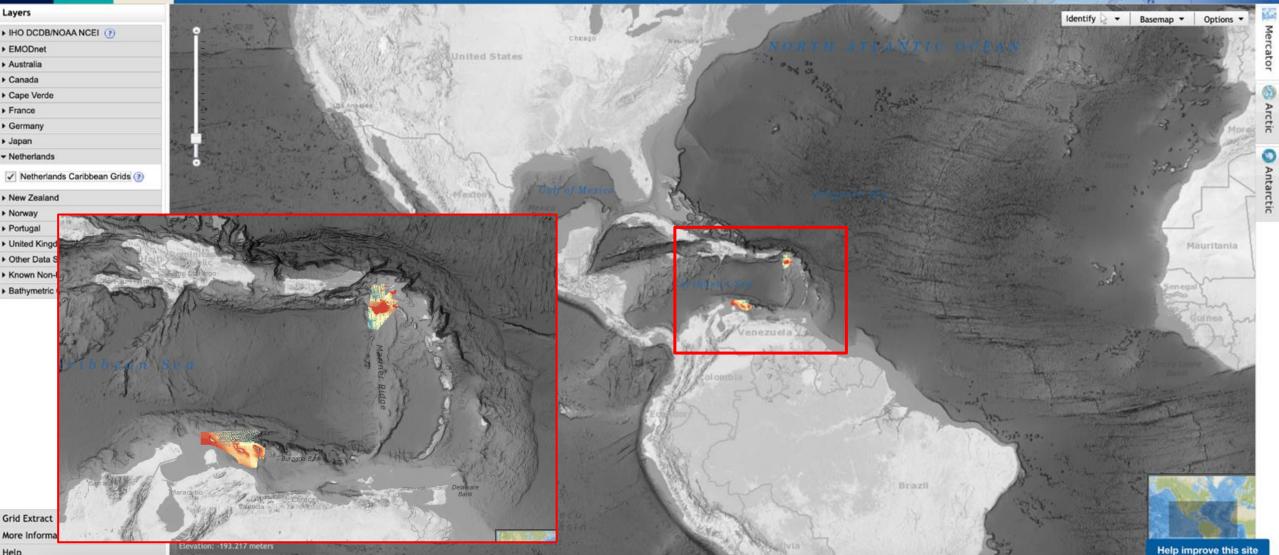
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IHO

International Hydrographic Organization

DCDB Web Services - Netherlands

Data Centre for Digital Bathymetry Viewer





International Hydrographic Organization

Thank you for your web services!

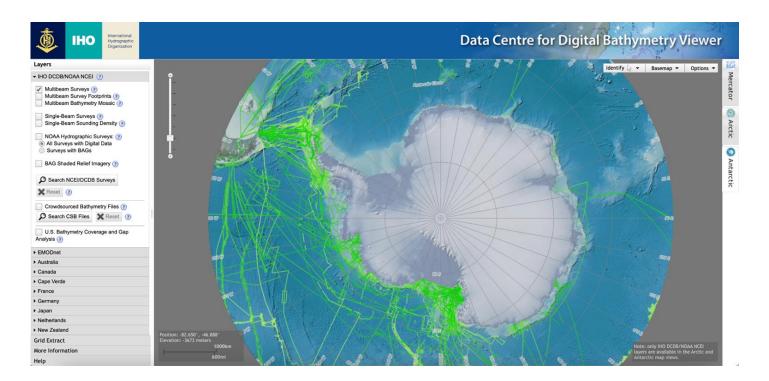
ncei.noaa.gov/maps/iho_dcdb/



MACHC Members are reminded to:

International Hydrographic Organization

- Contact the DCDB if issues arise when attempting to discover or access data
- Consider contributing data to the DCDB
- Consider building and/or including your web services in the DCDB viewer



ncei.noaa.gov/maps/iho_dcdb/

jennifer.jencks@noaa.gov

THE NIPPON FOUNDATION-GEBCO





THANK YOU

Diego Billings CSB/Seabed 2030 Coordinator for the MACHC Diego.Billings@nla.gov.jm

