Crowdsourced Bathymetry

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The Meso Atlantic & Caribbean Hydrographic Commission
23 June 2022

Agenda

Time	Action	Responsible
10:30 – 11:00	Virtual room opens for participants to join and test	All
11:00 - 11:10	Welcome	IHO Asst. Director, MACHC Chair, DCDB Director/CSBWG Chair
11:10 - 11:15	**Introduction and overview**: • Objectives for these sessions	MACHC CSB/ Seabed2030 Coordinator
11:15 - 11:40	**Session 1: The Crowdsourced Bathymetry Initiative**	MACHC CSB Seabed2030 Coordinator, IHO Asst. Director, DCDB Director/CSBWG Chair
11:40 - 11:50	Comments and Questions	All
11:50 - 12:15	**Session 2: How to contribute CSB data**	DCDB Director/CSBWG Chair, MACHC CSB Seabed 2030 Coordinator
12:15 - 12:25	Comments and Questions	All
12:25-12:35	**MACHC/IOCARIBE project**	MACHC CSB/ Seabed2030 Coordinator
12:35-12:40	Conclusions and remarks	MACHC CSB/ Seabed2030 Coordinator
12:40-12:45	End of webinar	MACHC CSB/ Seabed2030 Coordinator

Introduction and overview

	**MACHC-IOCARIBE Seabed 2030 Work Plan for 2022**	United Nations Educational, Scientific and Cultural Organization; Intergovernmental Oceanographic Commission

Objective 2.3. Encourage the collection and contribution of crowdsourced bathymetry (CSB) data among volunteer commercial and non-commercial vessels.

#	Action Item	Responsible Party	Due Date
011	**Provide information webinar on how to** respond to IRCC CL 1/2020 or IHO CL 21/2020 to allow for the provision of CSB data from ships within waters subject to their national jurisdiction into the public domain, according to national policy, or update it.	MACHC Members and Associate Members	As soon as possible
012	**Provide informational webinar on** how to carryout CSB field trials with designated "trusted nodes" (data liaisons) and data collectors (mariners) in the region to provide data to the IHO DCDB.	Seabed 2030 Coordinator with Interested Coastal States	April

Objectives for this webinar

1. Provide a detailed overview of the IHO Crowdsourced Bathymetry (CSB) Initiative
2. Explain the intent of the IHO and IRCC Circular Letters
3. Discuss current CSB data providers and mechanisms for CSB data contributions
4. ***Encourage discussion with webinar attendees on CSB and answer questions***
5. Discuss status and next steps for MACHC-IOCARIBE Seabed 2030 Project

Session 1:
The Crowdsourced Bathymetry Initiative

Jennifer Jencks

Director, IHO DCDB
Chair, IHO CSB Working Group

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The IHO Crowdsourced Bathymetry Initiative

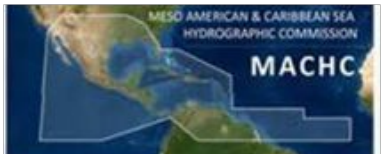
International Hydrographic Organization





Definition:

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



The IHO Crowdsourced Bathymetry Initiative

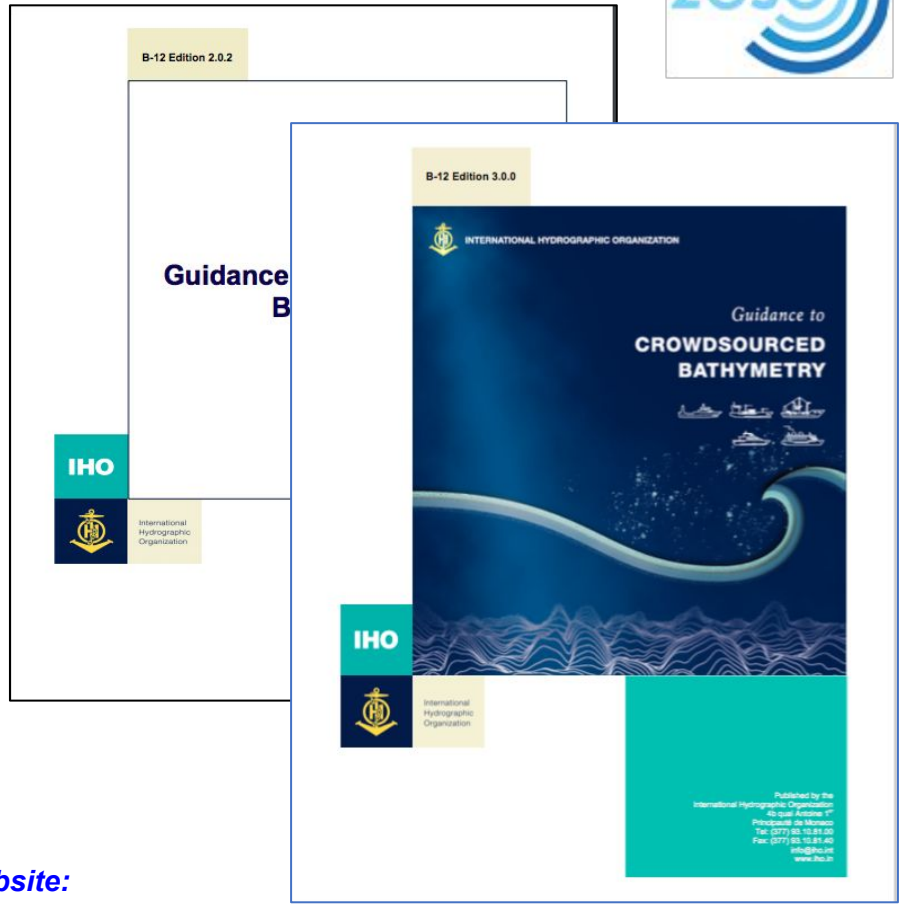
International Hydrographic Organization

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

The IHO Crowdsourced Bathymetry Initiative

A Working Group was formed and tasked to develop ***B-12 IHO Guidance on Crowdsourced Bathymetry*** that states the IHO's policy towards, and best practices for, the collection and contribution of CSB.

- Edition 2.0.0 was approved by MS in 2019.
- Edition 3.0.0 endorsed by IRCC 14 in June. **A call for approval will be issued via CL this summer.**



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).*

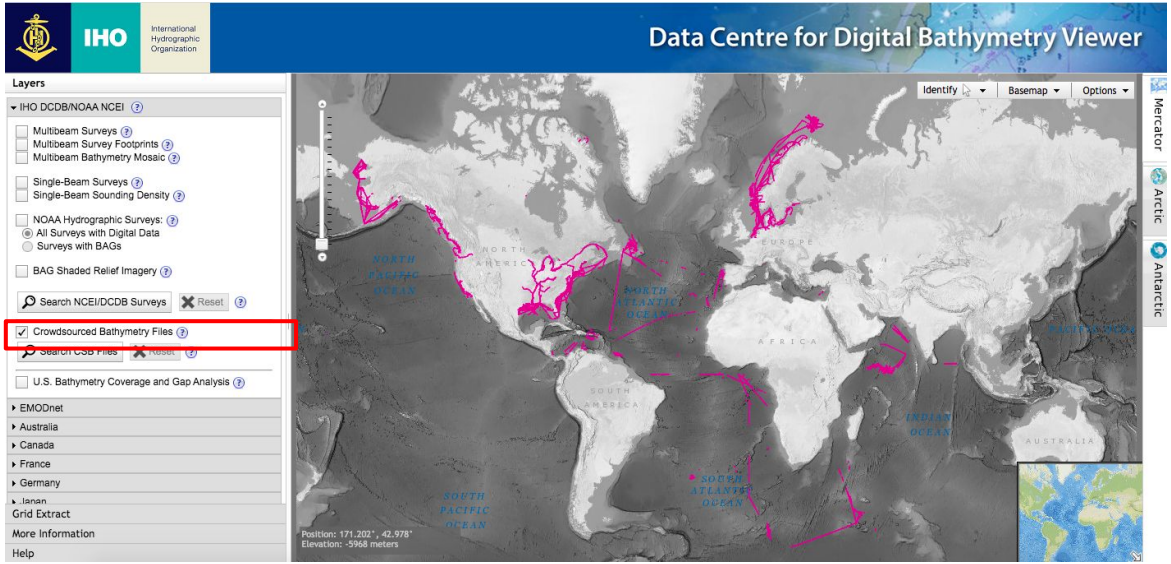
IRCC 14 Website:

iho.int/uploads/user/Inter-Regional%20Coordination/IRCC/IRCC14/IRCC14-07Ga_CSB-Guidance_Document-Edition_3.0.pdf

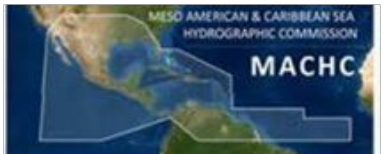
The IHO Crowdsourced Bathymetry Initiative

International Hydrographic Organization

The IHO DCDB established a data pipeline to allow the public to contribute, discover and download CSB data via a web-based map viewer interface.

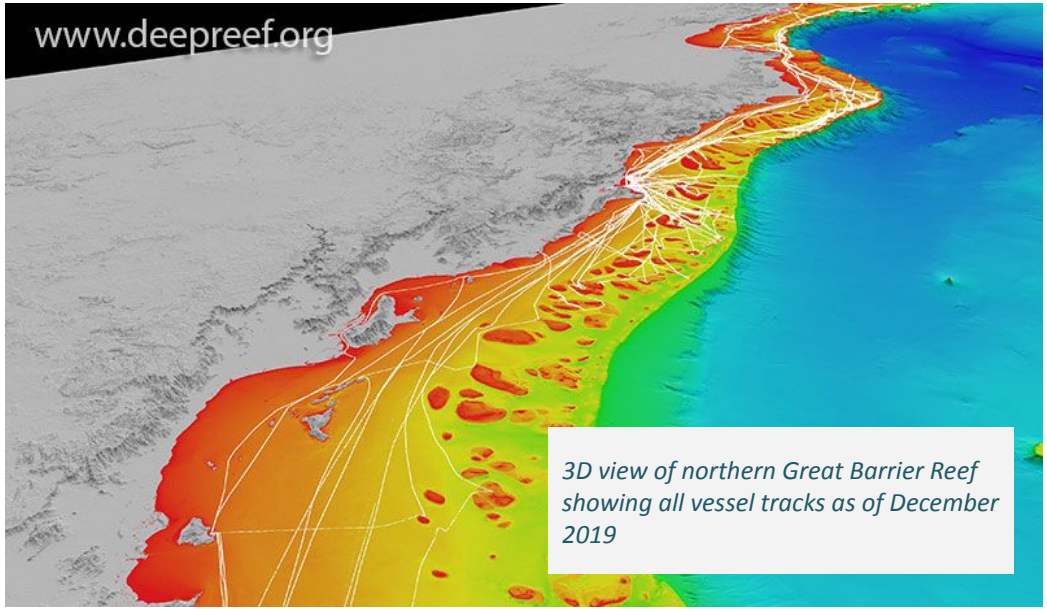


ncei.noaa.gov/maps/iho_dcdb

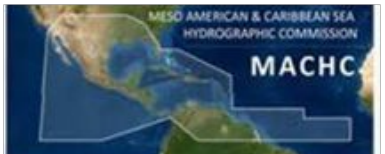


The Value of CSB Data

- 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.



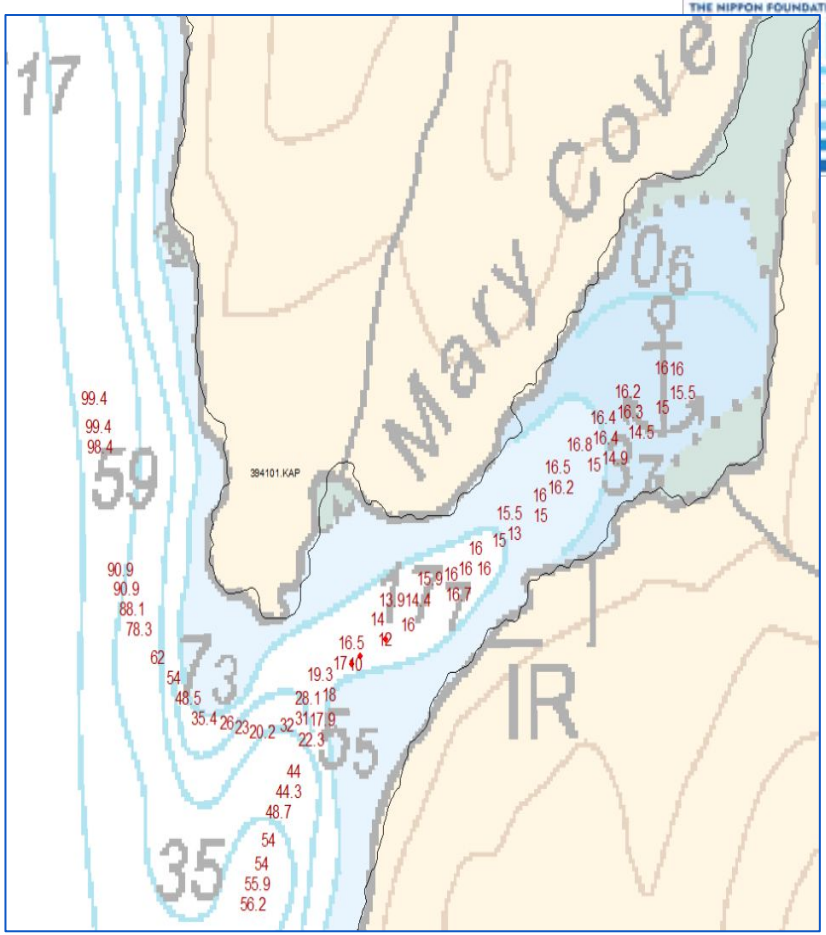
3D view of northern Great Barrier Reef showing all vessel tracks as of December 2019



...but only if vessels collect and donate depth information while on passage

The Value of CSB Data

- The Canadian Hydrographic Service has used CSB to update several Inside Passage charts along coastal routes.
- A systematic comparison of charted depths < 10 m yielded improved charted channel depths, data density and improved chart compilation in areas that were surveyed with single beam.
- CSB helped prioritize survey areas for the following survey season
- CSB has initiated the publication of Notices to Mariners.



CSB revealed some chart compilation problems.
Don't use the chart to figure out how much anchor chain you need!

IHO CL 01/2020 & IRCC CL 21/2020

- 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, 31 coastal States (green) have replied positively*

*iho.int/uploads/user/Inter-Regional%20Coordination/CSBWG/MISC/B-12_2020_EN_Acceptance_of_CSB_Data_in_NWJ_v3.0.pdf

IHO Circular Letter 21/2020

"...Member 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."

Organización Hidrográfica Internacional — OHI — International Hydrographic Organization

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Dossier de la OHI N.° S3/2649

CARTA CIRCULAR N.° 21/2020
03 de junio del 2020

DATOS DE BATIMETRÍA PARTICIPATIVA (CSB) DE LA OHI PARA EL DOMINIO PÚBLICO

Referencias:

A. CC de la OHI N.° 28/2019 del 13 de junio - *Adopción de la Edición 2.0.0 de la Publicación de la OHI B-12;*

B. CC de la OHI N.° 47/2019 del 25 de septiembre - *Aceptación de actividades en materia de Batimetría Participativa en aguas de jurisdicción nacional;*

C. CC de la OHI N.° 06/2020 del 20 de enero - *Aceptación de actividades en materia de Batimetría Participativa en aguas de jurisdicción nacional.*

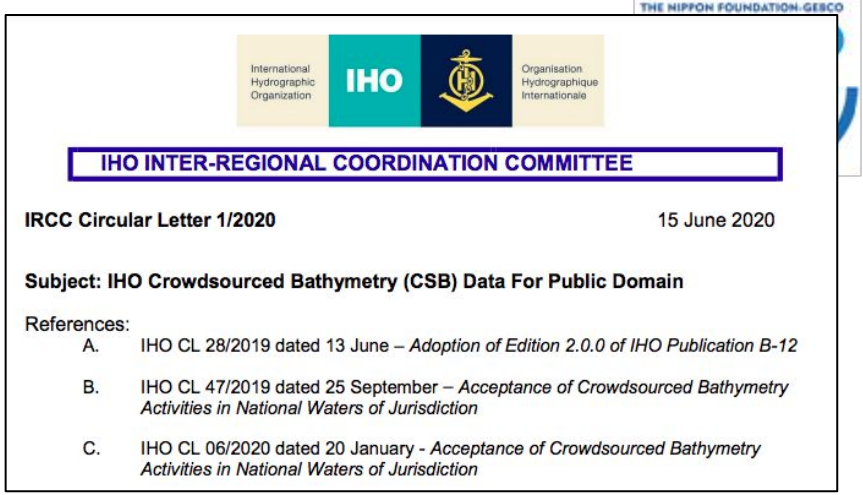
MACHC IHO Member States:
Brazil, **Colombia**, Cuba, Dominican Republic, France, Guatemala, Guyana, Jamaica, Mexico, **Netherlands**, Suriname, Trinidad and Tobago, United Kingdom, **United State of America**, Venezuela

The IHO encourages member states to review IHO CL/21/2020 and, if possible, offer a positive response to the IHO Secretariat prior to the MACHC23 plenary.

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

IRCC Circular Letter 1/2020

"...The Chairs of RHCs are requested to encourage associate members, observer States as well as any other coastal State within their region, to indicate their position on the provision of CSB data from ships within their waters of national jurisdiction"



International Hydrographic Organization — IHO — Organisation Hydrographique Internationale

IHO INTER-REGIONAL COORDINATION COMMITTEE

IRCC Circular Letter 1/2020 15 June 2020

Subject: IHO Crowdsourced Bathymetry (CSB) Data For Public Domain

References:

A. IHO CL 28/2019 dated 13 June – *Adoption of Edition 2.0.0 of IHO Publication B-12*

B. IHO CL 47/2019 dated 25 September – *Acceptance of Crowdsourced Bathymetry Activities in National Waters of Jurisdiction*

C. IHO CL 06/2020 dated 20 January - *Acceptance of Crowdsourced Bathymetry Activities in National Waters of Jurisdiction*

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

MACHC Observer States:
Dominica, Spain

The IHO encourages all coastal states to review IRCC CL 1/2020 and, if possible, offer response to your Seabed 2030 Coordinator (Cecilia Cortina Guzmán, cecilia.cortina@gmail.com) prior to the MACHC23 plenary.

https://iho.int/uploads/user/Inter-Regional%20Coordination/IRCC/IRCC_Letters/IRCC_Letter_2020_01_CSB_Activities.pdf

CL Questionnaire asks:

International Hydrographic Organization

For each area of jurisdiction (internal waters, territorial sea, EEZ):

- Do you support or object to the CSB data provision for depth measurements?
- Do you wish to be informed when such information is received by the IHO DCDB?
- Do you wish to review such information before its ingestion into the IHO DCDB?
- Do you wish for the opportunity to put caveats on the further dissemination of such data?

Enclosure to IHO CL 21/2020
IHO File S3/2649

CROWDSOURCED BATHYMETRY DATA PROVISION – COASTAL STATE POSITION FOR WATERS SUBJECT TO THEIR NATIONAL JURISDICTION

TEMPLATE FORM
(to be returned to the IHO Secretariat **no later than 4 Septemeber 2020**
E-mail: cl-lc@iho.int - Fax: +377 93 10 81 40)

IHO clarification on Crowdsourced Bathymetry Activity
For the purpose of this Circular Letter, the following terms have the specified meanings:
Bathymetry is the determination of ocean, coastal, and inland water depths. The general configuration of sea floor as determined by profile analysis of depth data.
Crowdsourcing is a process by which people and/or groups voluntarily submit observations, data, or information to accomplish a task or goal.
Crowdsourced bathymetry is defined by the IHO as the collection of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations.
Crowdsourced bathymetry data provision is the transmission to the IHO Data Centre for Digital Bathymetry for ingestion, aggregation, categorization, and public dissemination of depth measurements made by vessels, using standard navigation instruments, while engaged in routine maritime operations.

IHO Data Centre for Digital Bathymetry (DCDB) was established in 1990 to steward the worldwide repository of bathymetric data. The Centre archives and shares, freely and without restrictions, depth data contributed by mariners. The IHO DCDB is an IHO resource that is hosted by the U.S. National Oceanic and Atmospheric Administration (NOAA) on behalf of IHO Member States.
Internal Waters, Territorial Sea, and Exclusive Economic Zone have the same meanings as are given those terms under the 1982 UN Convention on the Law of the Sea.

Questions:
1) Do you support or object to the crowdsourced bathymetry data provision for depth measurements from the internal waters of your country?

SUPPORT □	OBJECT □
CAVEAT:	

International Hydrographic Organization

THE NIPPON FOUNDATION-GEBCO BED

ACCEPTANCE OF CROWDSOURCED BATHYMETRY ACTIVITIES AND PROVISION OF RESULTANT DATASETS IN NATIONAL WATERS OF JURISDICTION

1. Based on the comments received to the questionnaire in Annex B to IHO CL 11/2019 and to the questionnaire in Enclosure to IHO CL 21/2020, the following table is published as the Positive List to guide potential data gathering and provision activities undertaken by the wider maritime community in waters of national jurisdiction:

Coastal State	Internal	Caveat	Territorial	Caveat	EEZ	Caveat
Argentina	No	-	No	-	Yes	Provide copy of dataset to Hydrographic Office
Belgium	No	-	Yes	Inform Hydrographic Office of new dataset to allow review of data, provide copy of dataset and highlight major variances	Yes	Inform Hydrographic Office of new dataset to allow review of data, provide copy of dataset and highlight major variances
Brazil	No	Prior authorisation required, inform Hydrographic Office of new dataset to allow review of data; no MBES; gridded data only, raw data via HO	No	Prior authorisation required, inform Hydrographic Office of new dataset to allow review of data; no MBES; gridded data only, raw data via HO	Yes	Prior notification, no MBES; gridded data only, raw data via HO
Cameroon	Yes	Inform Hydrographic Office of new dataset to allow review of data	Yes	Inform Hydrographic Office of new dataset to allow review of data	Yes	Inform Hydrographic Office of new dataset to allow review of data
Canada	Yes	No MBES without approval; inform Hydrographic Office of new dataset	Yes	No MBES without approval; inform Hydrographic Office of new dataset	Yes	No MBES without approval; inform Hydrographic Office of new dataset
Colombia	No	-	No	-	Yes	Inform Hydrographic Office of new dataset to allow review of data

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Costa Rica	Yes	Any change in regulations, which restricts or impacts on data sharing, will be notified	Yes	Any change in regulations, which restricts or impacts on data sharing, will be notified	Yes	Any change in regulations, which restricts or impacts on data sharing, will be notified
Netherlands	Yes	Inform Hydrographic Office of new dataset	Yes	Inform Hydrographic Office of new dataset; detailed bathymetric surveys of wreck sites around Bonaire, Curaçao, Saba, Sint Eustatius and Sint Maarten falls under UNCLOS definition of scientific research and thus requires prior permission; resultant data cannot be published until authorised	Yes	Inform Hydrographic Office of new dataset; detailed bathymetric surveys of wreck sites around Bonaire, Curaçao, Saba, Sint Eustatius and Sint Maarten falls under UNCLOS definition of scientific research and thus requires prior permission; resultant data cannot be published until authorised
USA	Yes	None	Yes	None	Yes	None

iho.int/uploads/user/Inter-Regional%20Coordination/CSBWG/MISC/B-12_2020_EN_Acceptance_of_CSB_Data_in_NWJ_v3.0.pdf

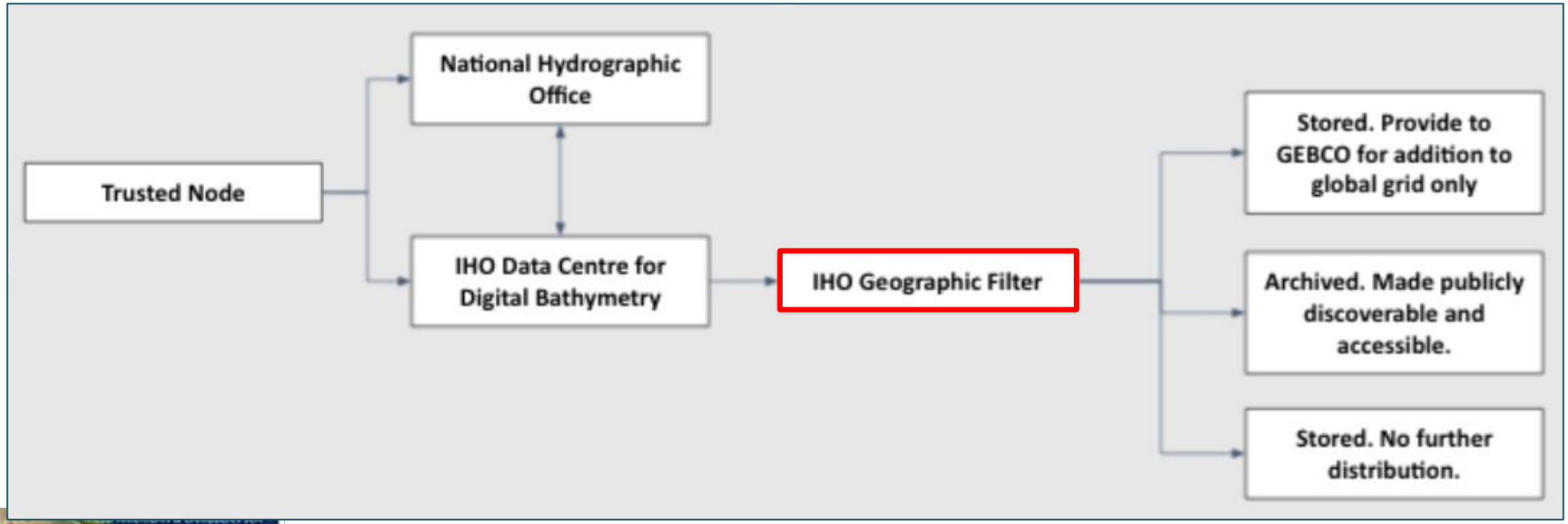
Geographic Filter

IHO

International Hydrographic Organization

THE NIPPON FOUNDATION-GEBCO SEABED 2030

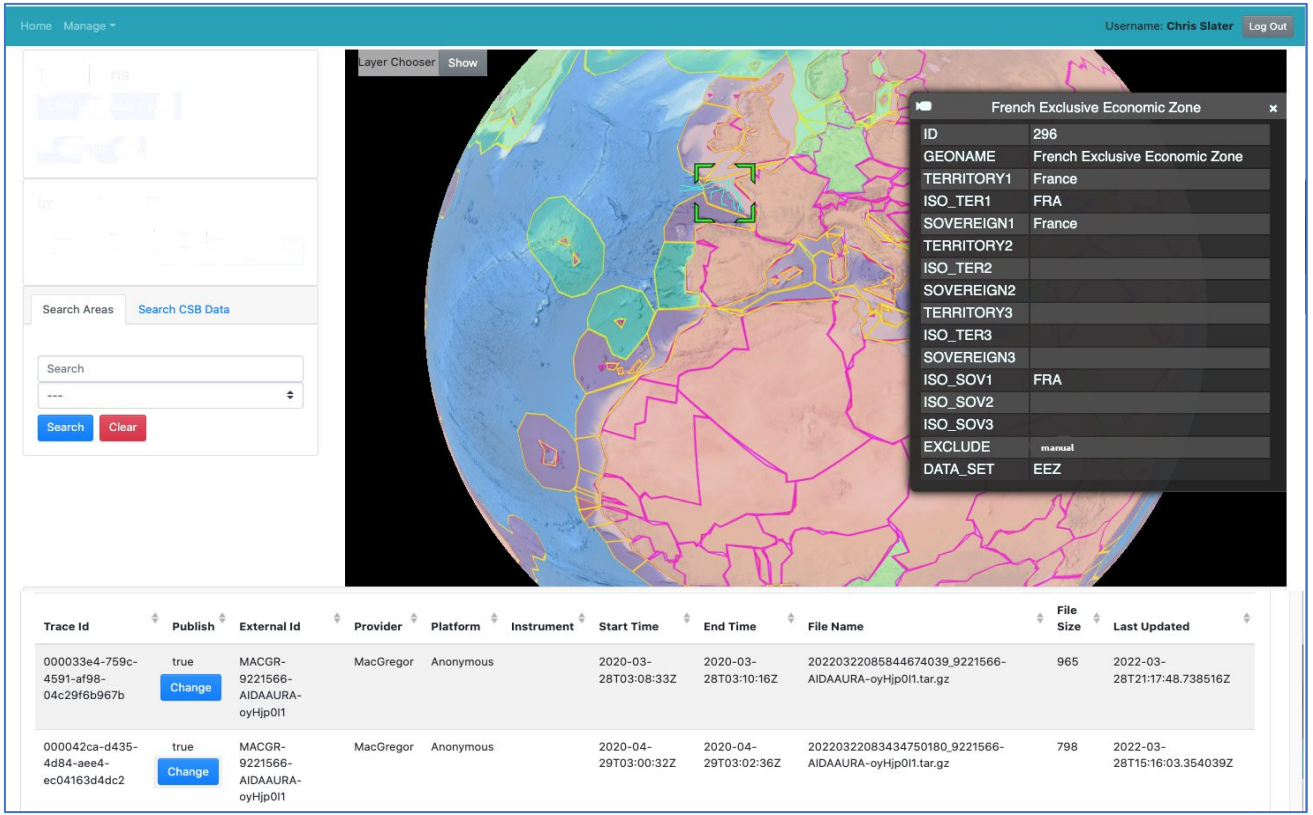
In response to feedback provided to IHO CL 11/2019, IHO CL 21/2020 and IRCC CL 1/2020, the DCDB implemented (and continues to update) a geographic filter for incoming data to take into account coastal countries' positions on the distribution of CSB collected in their areas of jurisdiction.



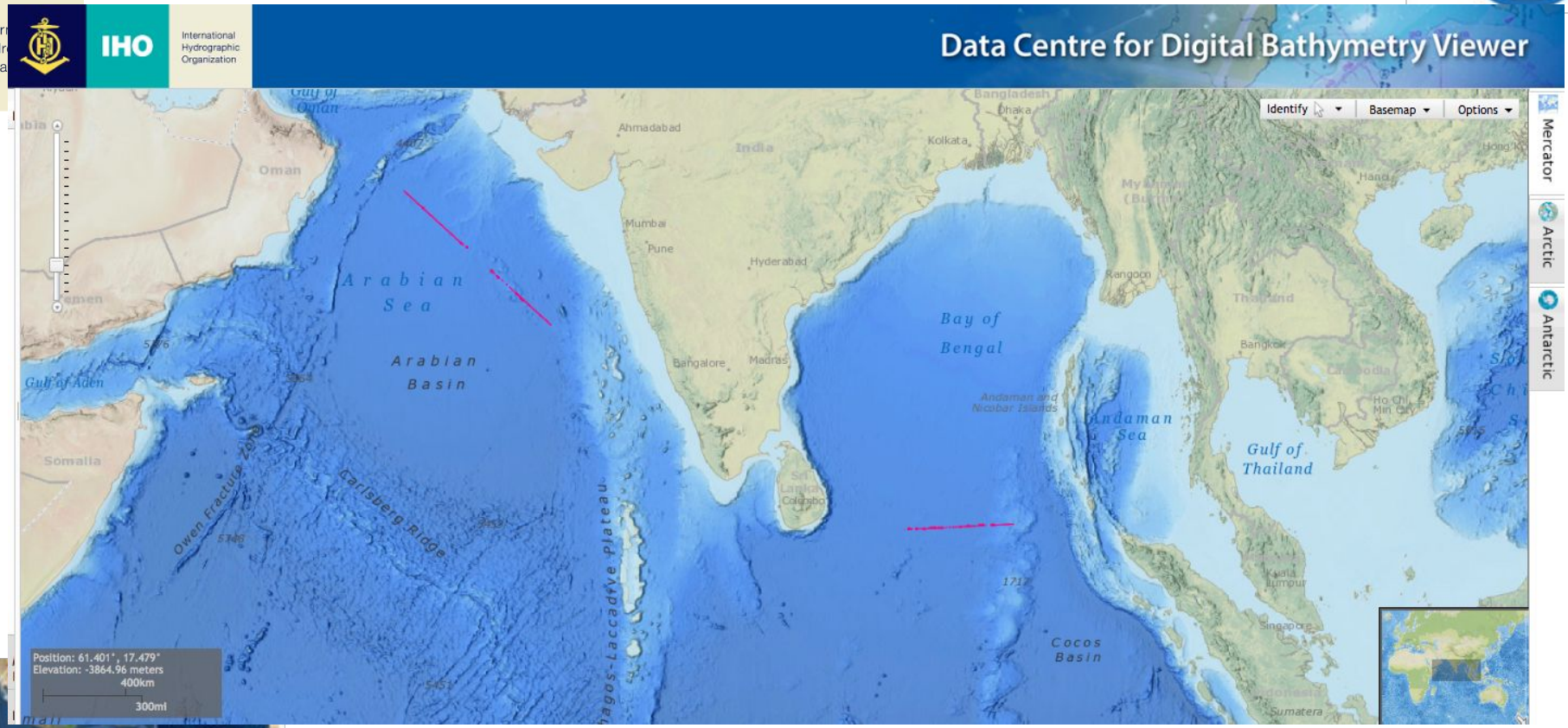
Geographic Filter

International Hydrographic Organization

The DCDB is currently working to automate the notification and approval process of data for coastal states who have provided positive responses but request pre-approval of data before the public distribution from DCDB.



CSB Data Holdings



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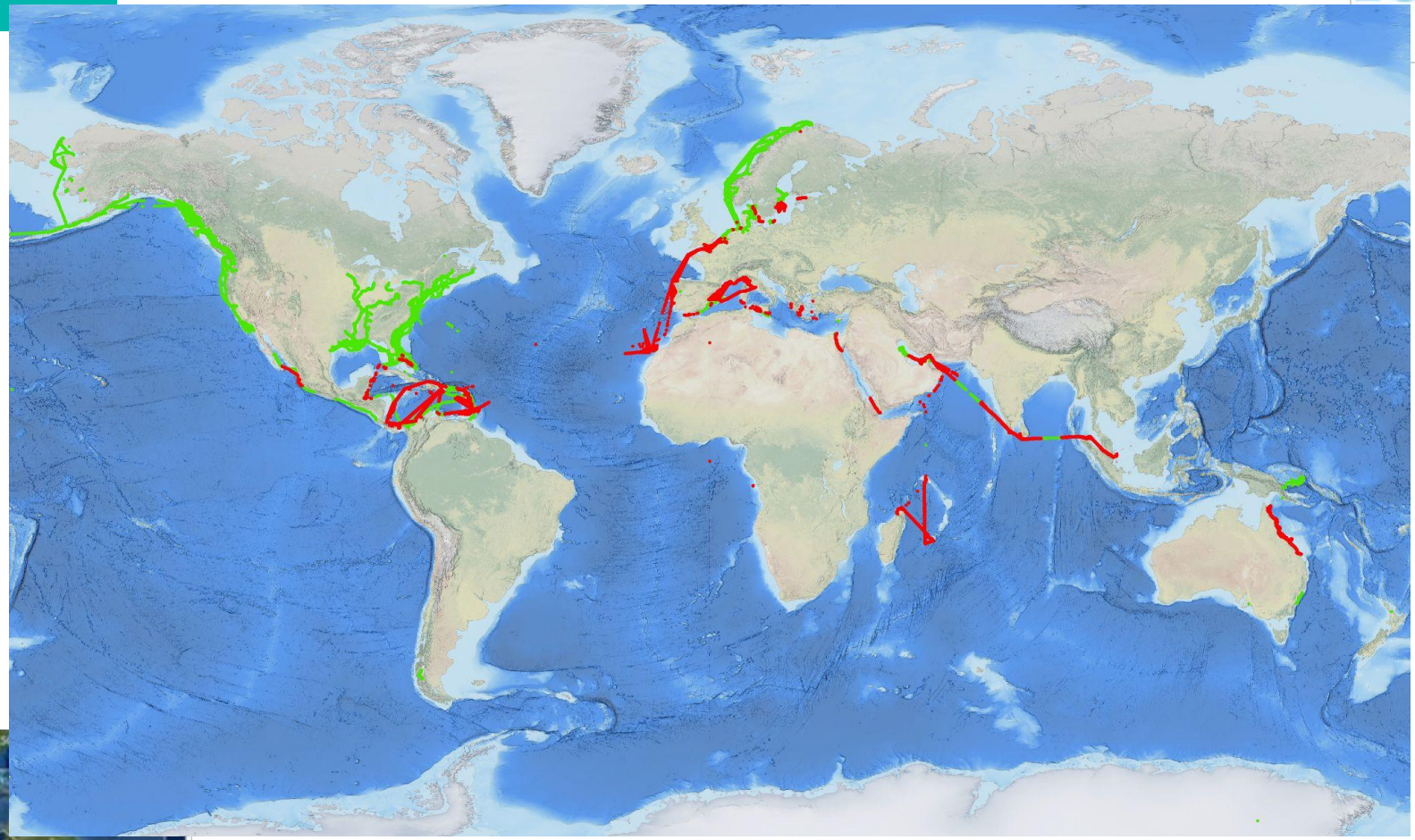
CSB Data Holdings

THE NIPPON FOUNDATION-GEBCO SEABED 2030



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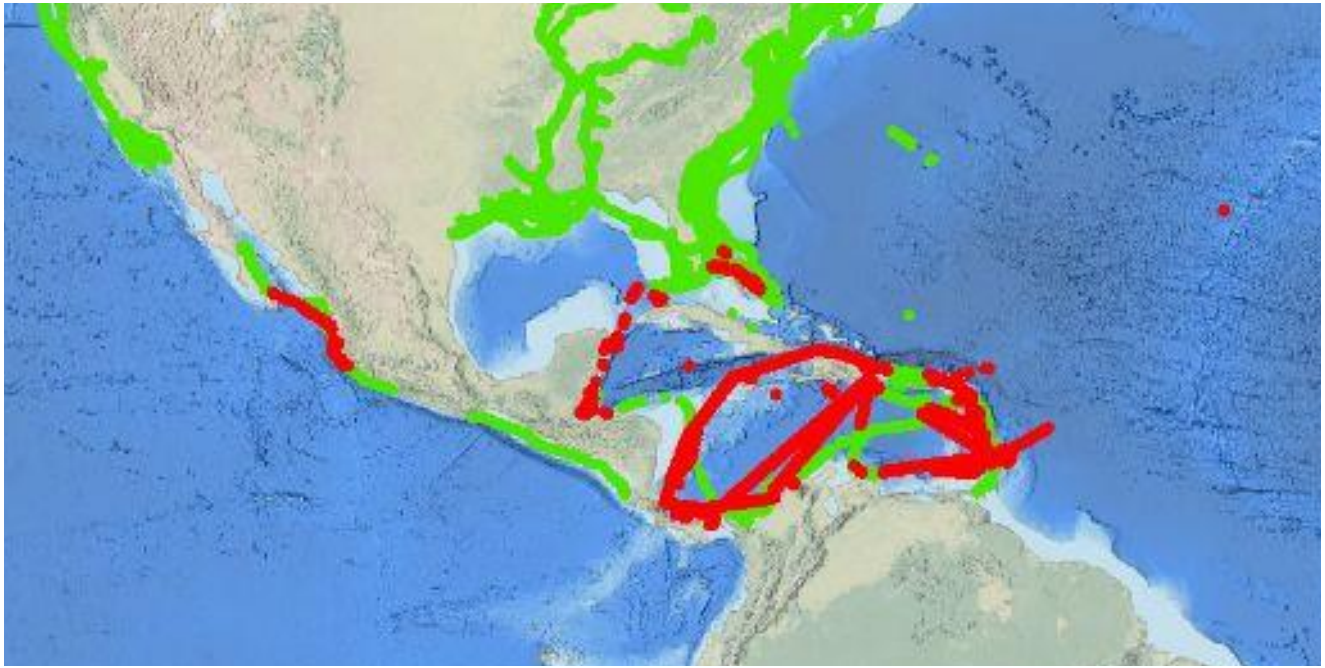
MACHC Region

THE NIPPON FOUNDATION-GEBCO SEABED 2030



ALL states are invited to ask questions and share perspectives.

Questions?

1. Are there any questions around the purpose of the CSB Initiative?
2. Is it clear what CSB data is? And what it is not?
3. What obstacles are Member States facing with responding to the circular letters?
4. Are there any questions or concerns about the Geographic Filter?
5. Any other questions?

Session 2:
How to contribute CSB data

Jennifer Jencks

Director, IHO DCDB
Chair, IHO CSB Working Group

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Cecilia Z. Cortina Guzman

MACHC CSB/SB2030 Coordinator
CSBWG Member

cecilia.cortina@gmail.com

How to 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).

CSB Trusted Nodes – Software Companies

Rose Point Navigation System

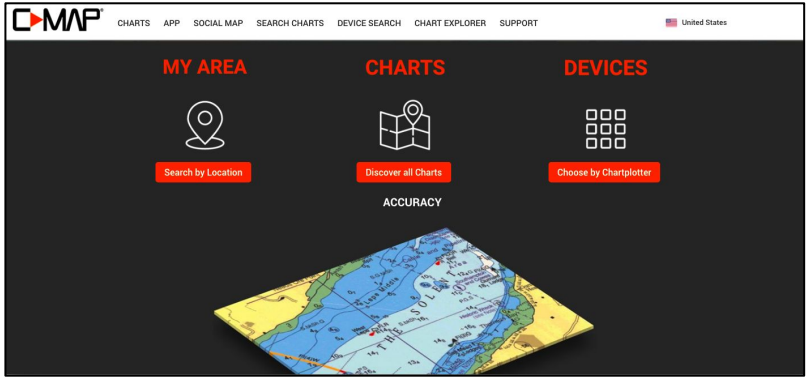
- Mariners can enable their electronic charting system log file to record *position, depth, and time*.
- When a mariner updates their software or chart catalog, data is transmitted to the DCDB

www.pcmaritime.com

www.rosepointnav.com

Navico C-MAP

- Finalized testing of new bathymetric feed b/w DCDB & navigation software company.
- Data contributions to begin this summer.

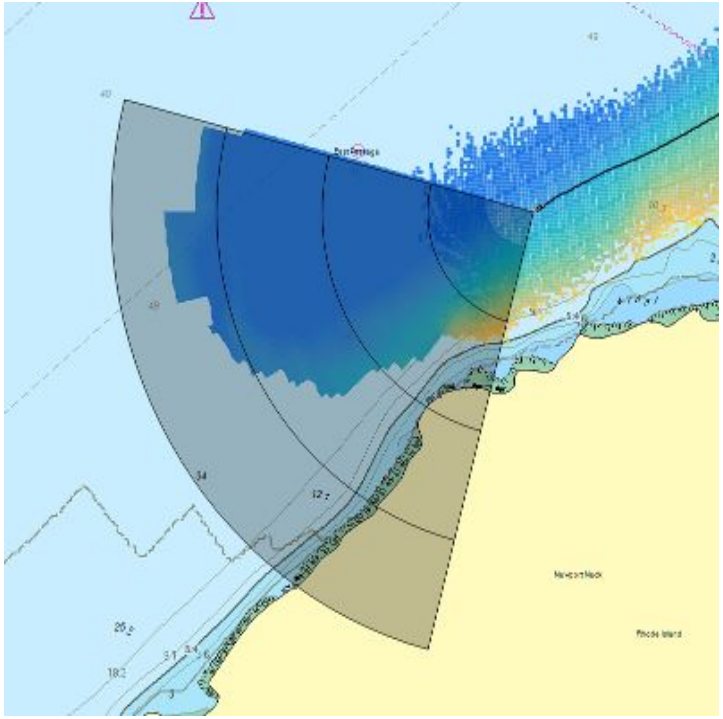


CSB Trusted Nodes – Hardware Companies

International Hydrographic Organization

FarSounder Inc.

- Designs and manufactures 3D Forward Looking Sonar (3D-FLS) for navigation and obstacle avoidance.
- Customers are given the option to participate in CSB collection and contribution



CSB Trusted Nodes – Cruise Line Industry

International Hydrographic Organization

Carnival Cruise Line

- Macgregor Germany supplies Carnival Cruise Lines with VDR solutions.
- Voyage Data Recorders (VDR) are a mandated device for effectively all ships on international voyages.
- By default, this device is logging depth sounding data for IMO mandated shipborne single beam devices.
- A bathymetric feed was established between MacGregor and the DCDB

Voyage Data Recorder

MACGREGOR

Carnival

CSB Trusted Nodes – Marine Contractors

Petroleum Geo-Services (PGS)

- Implemented a data feed from PGS vessels to the DCDB

M2Ocean

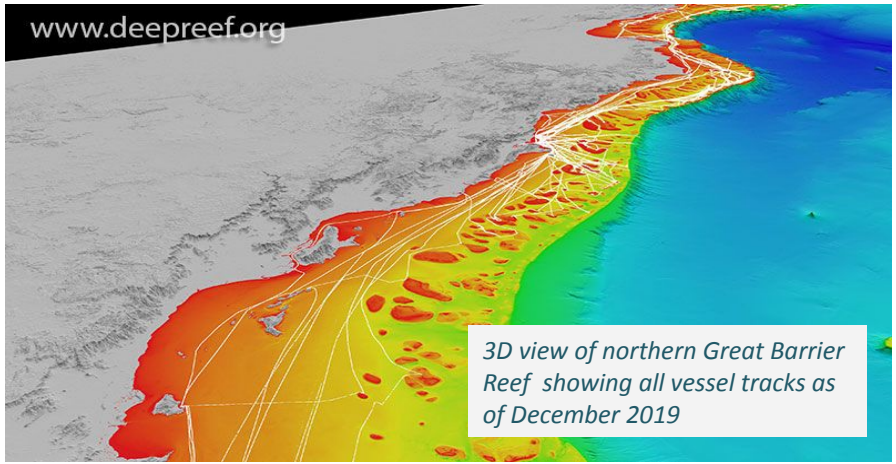
- Finalizing metadata content and testing data submissions with data collected by Hydroballs (small autonomous bathymetric buoys).
- Data contributions to begin this summer.

CSB Trusted Nodes – Academia/Research

James Cook University

- Distributed inexpensive data loggers to ~10 volunteer vessels using their own echo sounder and GPS sensors along the Great Barrier Reef
- Data is at the DCDB
- Awaiting interpretation of Australia's response to IHO CL 21/2020

SmartLog USB data logger



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

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

Greenland Institute of Natural Resources

- Phase 1: aim to engage approximately 50 vessels of various sizes - 30 data loggers deployed so far.

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.

Bureau of Marine Transportation - Palau

- 100 data loggers received
- Coordinating with S & W Pac Seabed 2030 Data Center
- Will receive support from U.S. Navy for logger installation and setup in 2022.

"Sea Lab 1", IMT – trial deployment (Credit: CDR Christoff Theunissen)

CSB Trusted Nodes – Seabed 2030-funded CSB Programs

International Hydrographic Organization

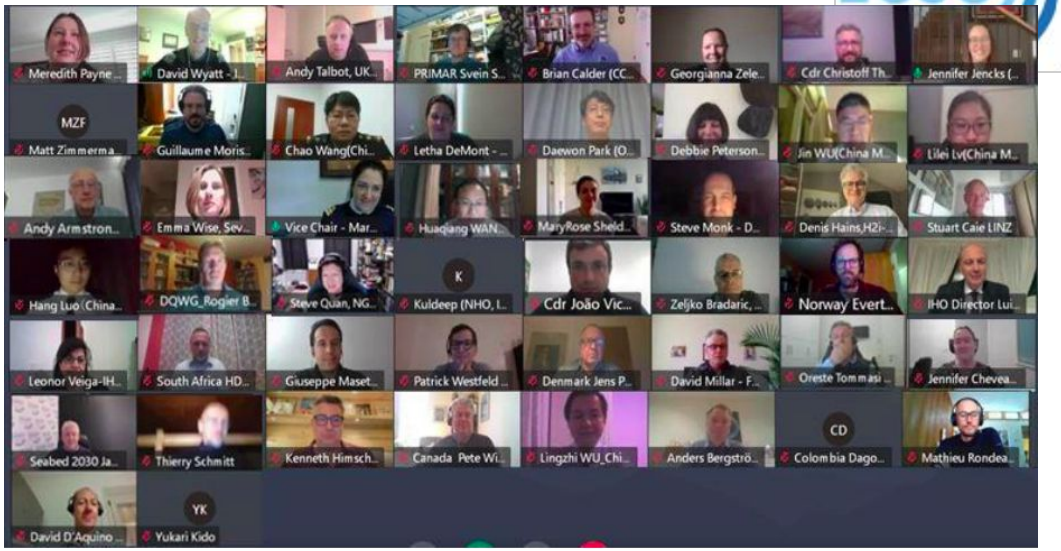
National Institute of Water and Atmospheric Research (NIWA):

- **MY Dapple:** Data loggers installed on main vessel and all work boats since October 2021.
- **NIWA Workboats:** Logging from data loggers and installed echo sounders.
- **Department of Conservation:** Data loggers en-route to be installed.
- **New Zealand Coastguard**: Discussions currently underway

IHO CSB Working Group

International Hydrographic Organization

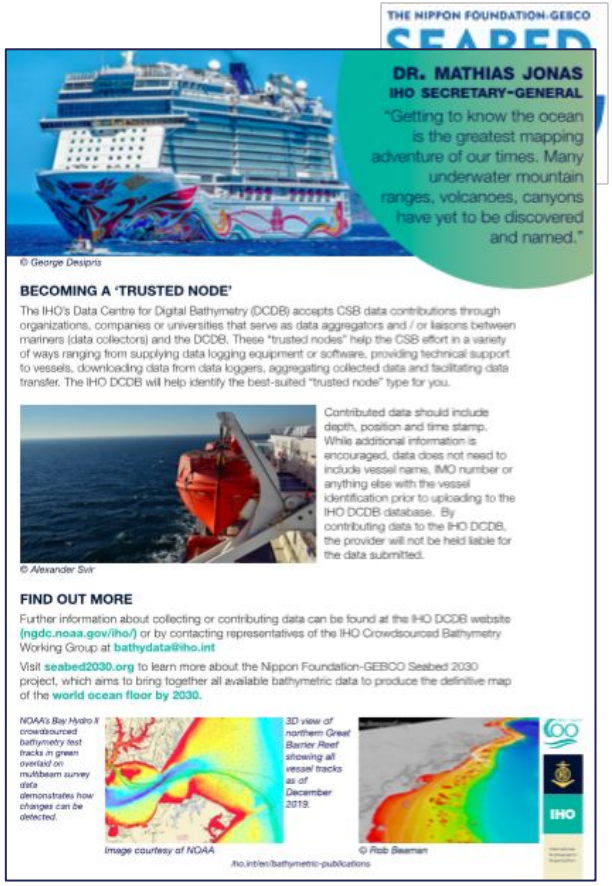
- **Meetings:** 13 meetings, 1 industry workshop
- **Chair:** Jennifer Jencks, USA; **Vice Chair**: Peter Wills, Canada
- **Representatives from 18 Member States:** Canada, China, Denmark, France, Germany, India, Italy, Lebanon, Mexico, Netherlands, New Zealand, Norway, Portugal, South Africa, Sweden,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



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

CSBWG Outreach

- Super yacht & leisure community
- Survey
- Geophysical & Submarine Cable industry
- Fisheries
- Cruise Line industry
- Software/hardware industry
- Hydrographic Offices
- Academic/Scientific Research



iho.int/en/communication-material

How can YOU become involved?

- Offer a positive response to the IHO or IRCC Circular Letters before the MACHC 23.
- Participate in the IHO CSB Working Group
- Volunteer to become the next Seabed 2030-funded CSB Program!
- ***Reach out to your coordinator with ANY questions you may have.***

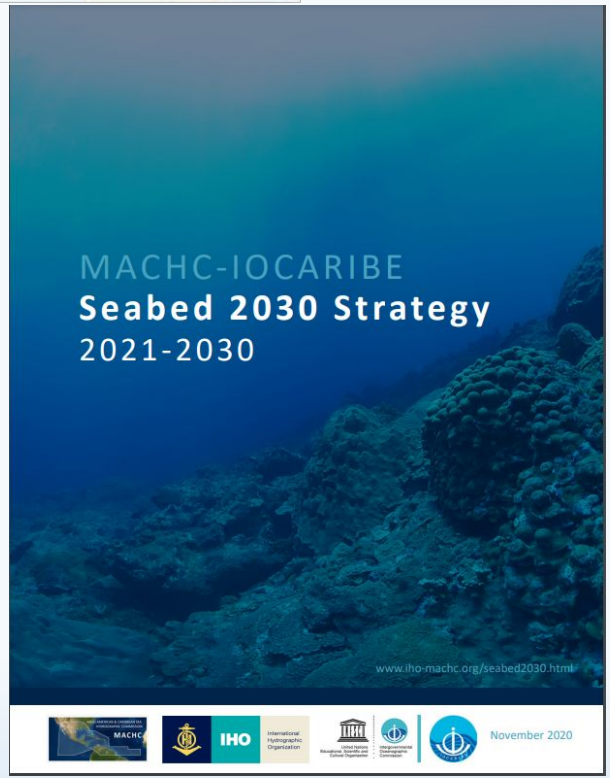
Please contact your CSB/Seabed 2030 Coordinator **- Cecilia Cortina Guzmán, cecilia.cortina@gmail.com**

ALL states are invited to ask questions and share perspectives.

Questions?

1. Do you have questions about how to collect or contribute CSB data?
2. Do you know of any organization, company, academic institution that might be interested in collecting/contributing CSB data?
3. Do you have any questions about the CSB Working Group?
4. Any other questions?

MACHC-IOCARIBE Seabed 2030 Project



MACHC-IOCARIBE
Seabed 2030
Work Plan for 2022

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

https://www.iho-machc.org/documents/seabed2030/Agendas/MACHC21_2020-06.1.1_EN_MACHC.IOCARIBE_Seabed_2030_Strategy.pdf

MACHC-IOCARIBE Seabed 2030 Project

Current Mapping Status in the Region

Reported in MACHC22 (2021)

- ✔Brazil
- ✔Dominican Republic
- ✔France
- ✔Germany
- ✔Japan

- ✔Netherlands
- ✔Norway
- ✔Russia
- ✔USA
- ✔Venezuela

GEBCO 2020: 20% mapped

GEBCO 2021: **23%** mapped

MACHC-IOCARIBE Seabed 2030 Project

Webinar 2021: https://www.iho-machc.org/documents/seabed2030/Agendas/MACHC_Webinar1_FerriniJencks.pdf

MACHC-IOCARIBE Seabed 2030 Project

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
COMMISSION OCÉANOGRAPHIQUE INTERGOUVERNEMENTALE
COMISIÓN OCEANOGRÁFICA INTERGUBERNAMENTAL
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ
اللجنة الدولية الحكومية لعلوم المحيطات
政府间海洋学委员会

UNESCO

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E-mail: v.ryabinin@unesco.org

Ref. : IOC/VR/22.286/JB/AC/ml 3 June 2022

Subject: Endorsement letter of Decade Action No.140.2

Dear Ms Cortina,

It is with great pleasure that I am writing to inform you of the endorsement of your Decade Action entitled "No 140.2. MACHC-IOCARIBE Seabed 2030 Project" as a project forming part of the UN Decade of Ocean Science for Sustainable Development 2021-2030. Please accept my sincere congratulations for this achievement. Let me also thank you for your engagement and commitment to the Ocean Decade vision of the science we need for the ocean we want.

Conclusions and remarks

- “No 140.2. MACHC-IOCARIBE Seabed 2030 Project” has been endorsed by the IOC Executive Secretary as part of the UN Ocean Decade.

- IRCC14-09A: MACHC Paper on establishing a Seabed 2030/CSB Coordinator Collaboration Team.

- MACHC 23 “November 28- December 2” (dates and locations tbc).

Thank you.

cecilia.cortina@gmail.com

jennifer.jencks@noaa.gov