Crowdsourced Bathymetry initiative

28th May 2021

MBSHC22 Agenda Item 6.8

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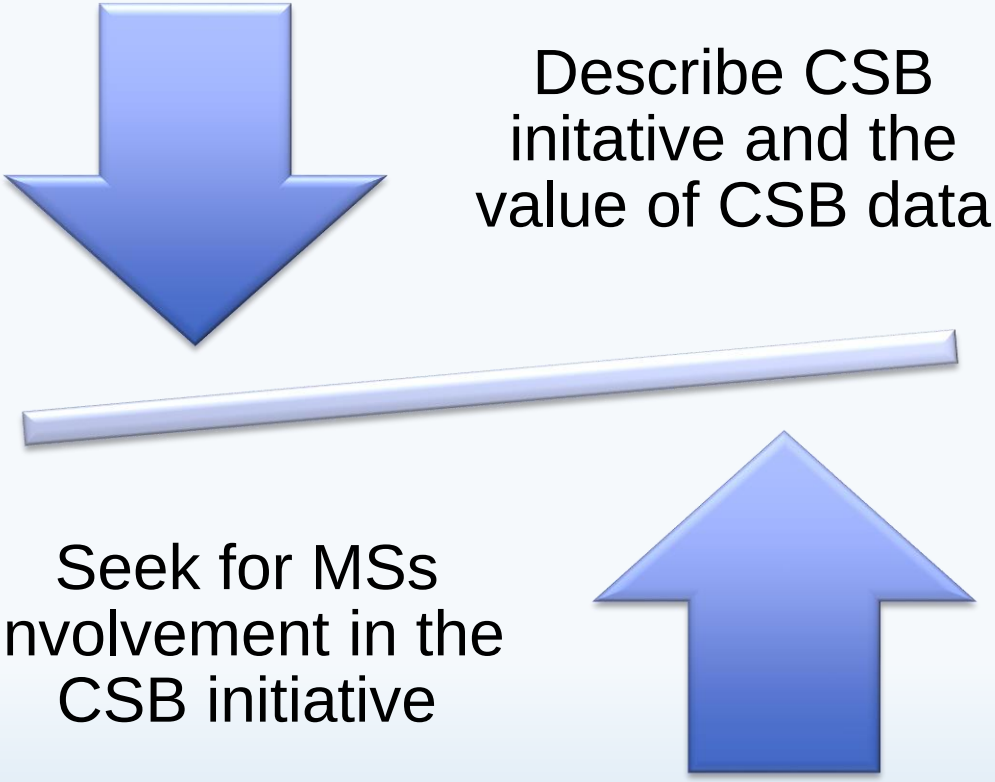
Scope of the presentation



IHO Crowdsourced Bathymetry Initiative

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

IHO Crowdsourced Bathymetry Initiative

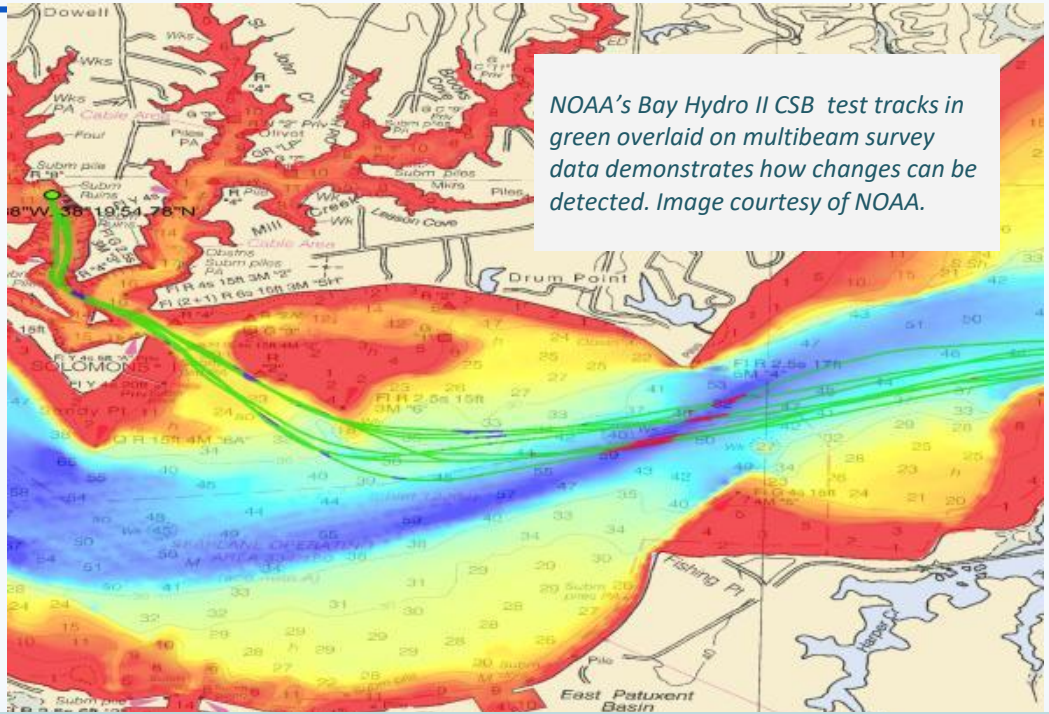
In 2014, the IHO initiated a collaborative project to enable mariners to collect “crowdsourced bathymetry”.

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.

IHO Data Centre for Digital Bathymetry (DCDB) built a data pipeline that allows the public to contribute, and discover and download CSB data via a web-based map viewer interface.

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)
- Useful along shallow, complex coastlines
- Identify uncharted features
- Assist in verifying charted information
- Confirm whether charts are appropriate for the latest traffic patterns.



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

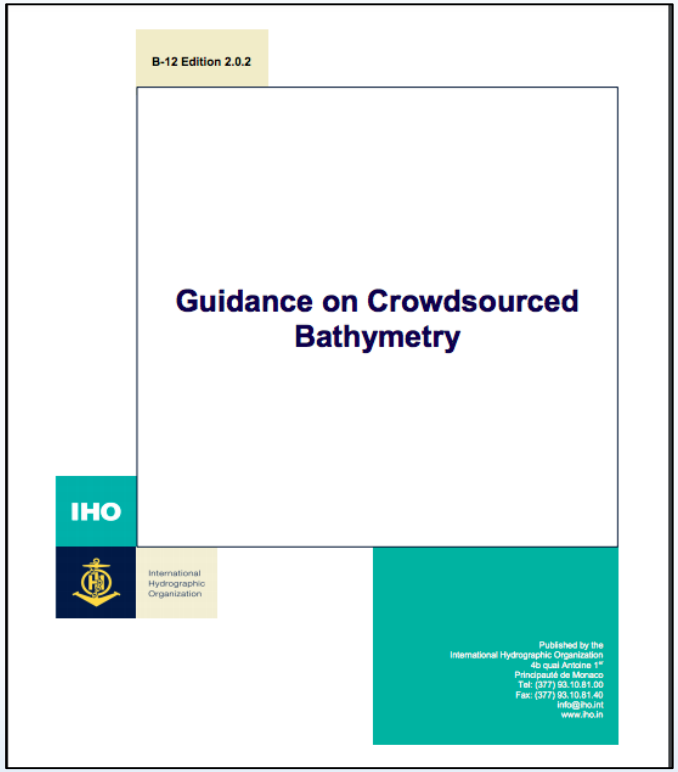
...but only if vessels collect and donate depth information while on passage

IHO CL 11/2019

“CALL FOR APPROVAL OF EDITION 2.0.0 OF IHO PUBLICATION B-12”

35 Member States approved the adoption of B-12 out of 38 replies.

iho.int/uploads/user/pubs/bathy/B_12_Ed2.0.3_2020.pdf



IHO CL 11/2019 **Annex B**

“ACCEPTANCE OF CROWDSOURCED BATHYMETRY ACTIVITIES IN NATIONAL WATERS OF JURISDICTION”

- 15 IHO MS replied “positive”
  - CL 47/2019 provides a summary analysis of positive responses **==>**
- The DCDB now filters out CSB data collected from the waters of all coastal countries not included on the positive list.
- The lack of initial replies showed that the CL ask was not clear.

ACCEPTANCE OF CROWDSOURCED BATHYMETRY ACTIVITIES IN NATIONAL WATERS OF JURISDICTION

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

Member State	Area	Specific actions required
Argentina	EEZ only	Provide copy of dataset to Hydrographic Office
Brazil	EEZ only	Provide copy of dataset to Hydrographic Office
Canada	All waters – no multibeam activity without prior permission	Inform Hydrographic Office of new dataset
Cyprus	All waters	Provide copy of dataset to Hydrographic Office
Denmark	All waters – no multibeam activity without prior permission	Inform Hydrographic Office of any variance with published chart
Georgia	All waters	Provide copy of dataset to Hydrographic Office
Germany	All waters	Inform Hydrographic Office of new dataset
Monaco	All waters	Provide copy of dataset to Hydrographic Office
Netherlands	All waters - 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	Inform Hydrographic Office of new dataset
New Zealand	All waters	Inform Hydrographic Office of new dataset
Norway	All waters – no multibeam activity without prior permission	Inform Hydrographic Office of new dataset
Philippines	Shipping routes and transit passages only	None
South Africa	EEZ only	Provide copy of dataset to Hydrographic Office
Sweden	EEZ only	Inform Hydrographic Office of new dataset
USA	All waters	None

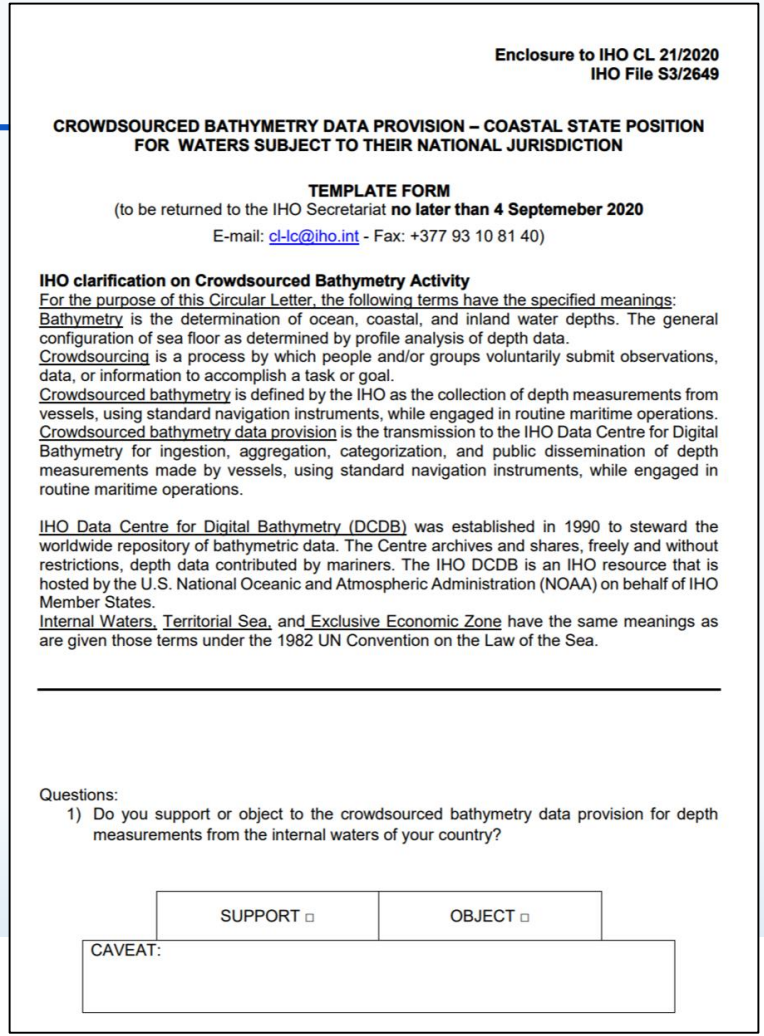
IHO CL 21/2020 & IRCC CL 01/2020

- All Coastal States are now requested to indicate their position on the ***provision of CSB data*** from ships within waters subject to their national jurisdiction into the public domain
- To date, 30 coastal states (green) have replied positively
- The geographic filter will be updated in 2021 to reflect updated coastal state positions.

iho.int/uploads/user/circular_letters/eng_2020/CL21_2020_EN_v1.pdf
iho.int/uploads/user/Inter-Regional%20Coordination/IRCC/IRCC_Letters/IRCC_Letter_2020_01_CSB_Activities.pdf

CL Questionnaire asks:

- Do you support or object to the CSB data provision for depth measurements from the internal waters, territorial sea, or EEZ of your country?
- 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)

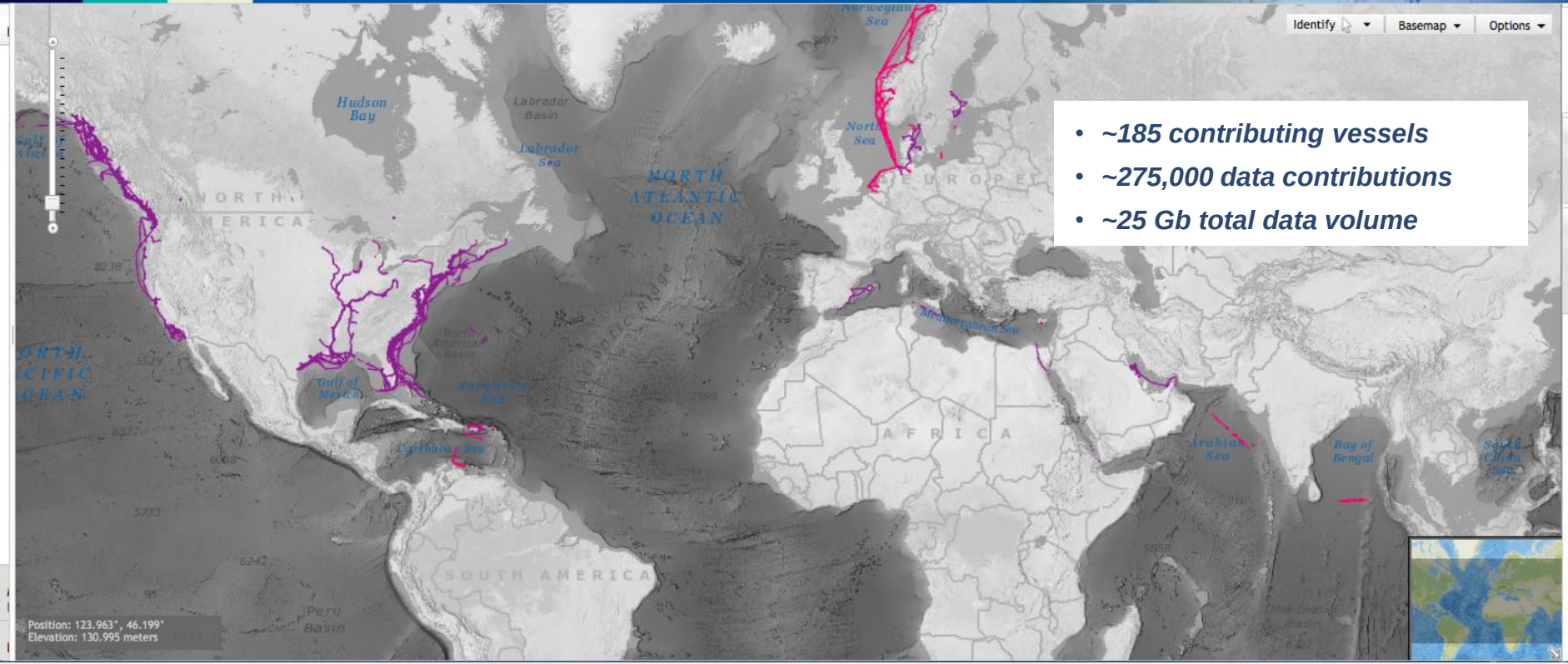
IHO clarification on Crowdsourced Bathymetry Activity
For the purpose of this Circular Letter, the following terms have the specified meanings:
Bathymetry is the determination of ocean, coastal, and inland water depths. The general configuration of sea floor as determined by profile analysis of depth 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?

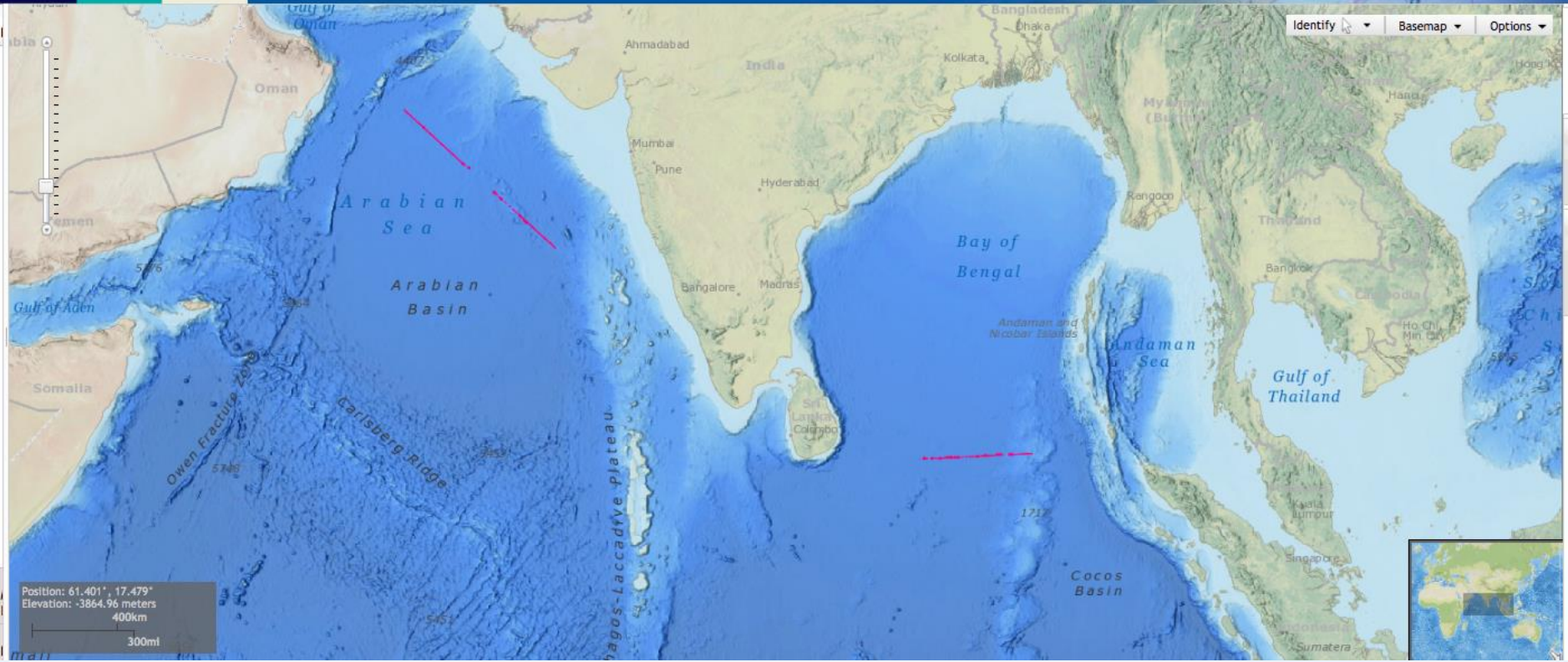
SUPPORT □	OBJECT □
CAVEAT:	

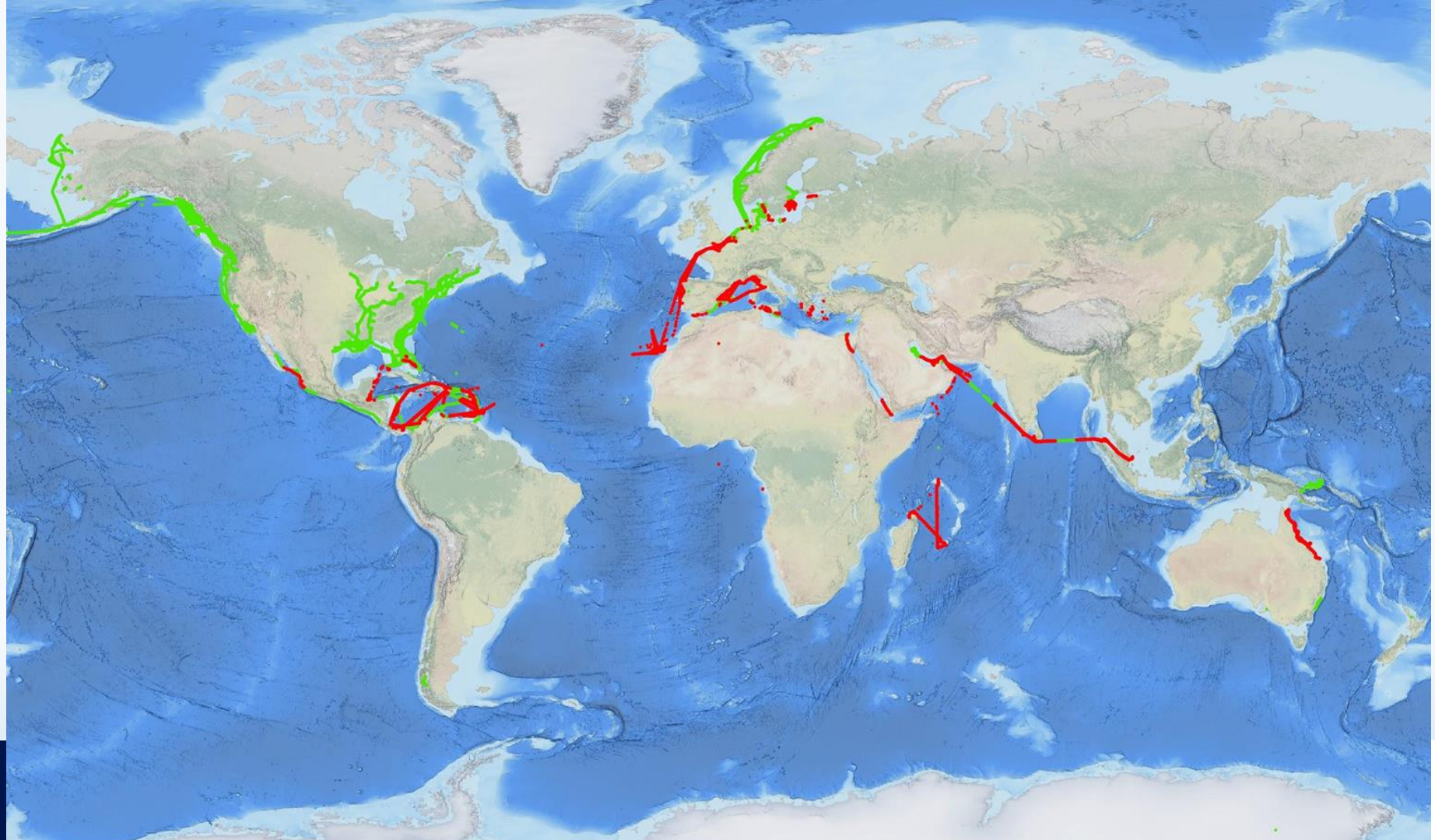
Data Centre for Digital Bathymetry Viewer



- *~185 contributing vessels*
- *~275,000 data contributions*
- *~25 Gb total data volume*

Data Centre for Digital Bathymetry Viewer





How to 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).

Those interested in contributing data or becoming a Trusted Node should contact the DCDB at bathydata@iho.int.

CSB Trusted Nodes - *Current*

Rose Point Navigation System

- Mariners can enable their electronic charting system log file to record position, depth, and time.

www.pcmaritime.com

www.rosepointnav.com

MacGregor/Carnival Cruise Line

- Data provided by Voyage Data Recorders (VDR) logging depth sounding data for IMO mandated shipborne single beam devices.

Voyage Data Recorder

CSB Trusted Nodes - *In-process*

James Cook University (Australia)

- Distributed inexpensive data loggers to ~100 volunteer vessels using their own echo sounder and GPS sensors along the Great Barrier Reef
- Data is at the DCDB
- Awaiting Australia's response to IHO CL 21/2020

SmartLog USB data logger

Petroleum Geo-Services (PGS)

- Just established a bathymetric feed from PGS vessels to the DCDB

Seabed 2030-funded CSB Field Trials

Objective:

1. Facilitate field trials that will accelerate CSB activity
2. Collect data in data scarce areas
3. Grow excitement about the CSB initiative
4. Develop a repeatable regional CSB mapping project strategy

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. Act as a data assembly center
4. Provide a copy of these data to the IHO DCDB to be used in the GEBCO grid

Seabed 2030-funded CSB Field Trials

The Institute For Maritime Technology & The South African Navy Hydrographic Office

- 200 data loggers have finally arrived (supply chain delays due to sourcing components post COVID)
- Testing to begin soon
- Data receipt expected in mid 2021

Bureau of Marine Transportation - Palau

- Recent arrival of 100 loggers

Provision of data loggers

- NMEA0183 and NMEA2000
- Installation support (where needed)

IHO CSB Working Group

- **10 meetings; 1 Industry workshop**
- Chair (Jennifer Jencks, USA) and Vice-Chair (Pete Wills, Canada)
- **Representatives from 16 Member States:**
  - *Canada, Croatia, Italy, Nigeria, Norway, Philippines, Denmark, Finland, France, Germany, India, Netherlands, Portugal, UK, & USA, South Africa*
- **Observers and expert contributors:**
  - *CCOM-JHC, ChartWorld/SevenC's, 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,TeamSurv, Teledyne CARIS, Sea-ID, World Maritime University, and World Ocean Council*
- **IHO:** Assistant Director David Wyatt

CSBWG2: 10-11 Jan 2016
Boulder, Colorado, USA

CWBWG8:23-25 Oct 2019
Monaco

CSB/Seabed 2030 Ambassador

The CSBWG submitted a paper to IRCC 12 requesting:

"Support for the modification of the current "RHC Seabed 2030 Coordinator" to a joint "RHC CSB/Seabed 2030 Coordinator."

This figure would serve as a ***member of the IHO CSBWG and as the point of contact to the relevant Seabed 2030 regional centers*** and be charged with leading the discussion of the future tasks for RHCs that will be formalized with the new IHO Strategic Plan.

IRCC12-08A.2:

iho.int/uploads/user/Inter-Regional%20Coordination/IRCC/IRCC12/IRCC12-08A.2_Paper_RHC_and_CSB_FINAL.pdf

CSB/Seabed 2030 Ambassador

- Liaise with appropriate GEBCO Seabed 2030 Regional Data Assembly and Coordination Centres
- Consider traditional hydrographic collection methods as well as others that may apply, including CSB, SDB, scientific data collection, and industry-specific data and serve as a point of contact for other working groups accordingly.
- Report the state of regional ocean mapping efforts, including national statistics (according to Reg. Centre data)
- Lead regional efforts to coordinate potential data collection opportunities, connecting data providers with the appropriate GEBCO Regional Centres.
- Encourage national commitments for data sharing and new data collection.
- Develop joint regional campaign mapping plans for areas outside national jurisdiction.
- Ensure that efforts to collect data for Seabed 2030 are coordinated within the region
- Place a strong emphasis on acknowledging participation from data providers.

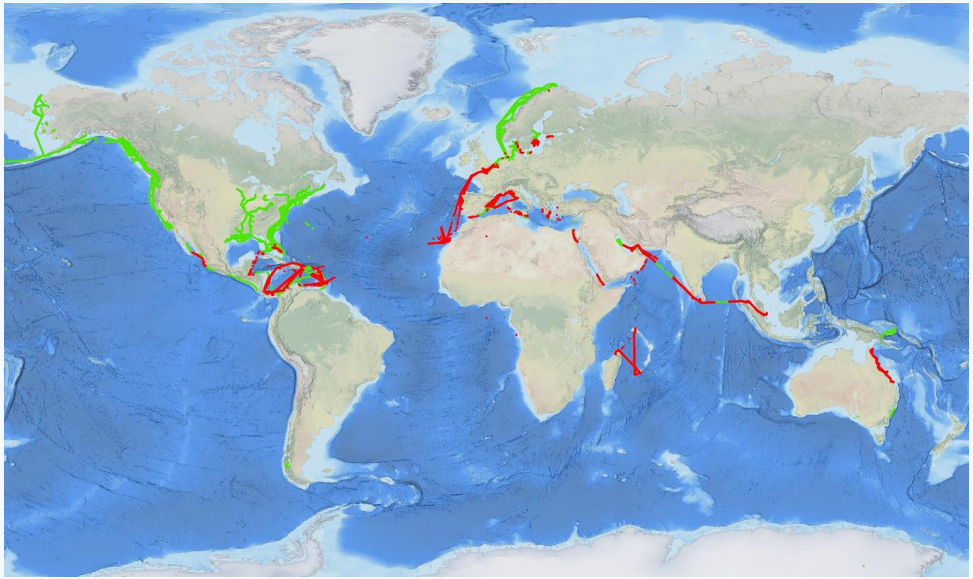
CSB/Seabed 2030 Ambassador

Are there volunteers to replace Italy?

Being a member of CSBWG is not a pre-requisite (preferable).

How can HOs become involved?

- Offer a positive response to the IHO or IRCC Circular Letters
- Select a CSB/SB2030 Coordinator to represent RHC on the CSBWG
- Consider joining and/or attending the CSBWG - it is open to all!
- Volunteer to become the next Seabed 2030-funded CSB Program!
- **USE CSB DATA THROUGH A PROPER QUALITY ASSESSMENT**



DQWG provided guidance for HOs

Direct link between DQWG and CSBWG since 2019 thanks to the ToR amendment
See DQWG web page

Take away…

«Good data quality does not mean that the quality of data has to be good. It means that the end user is well informed in how the quality of data is»

By Rogier B.

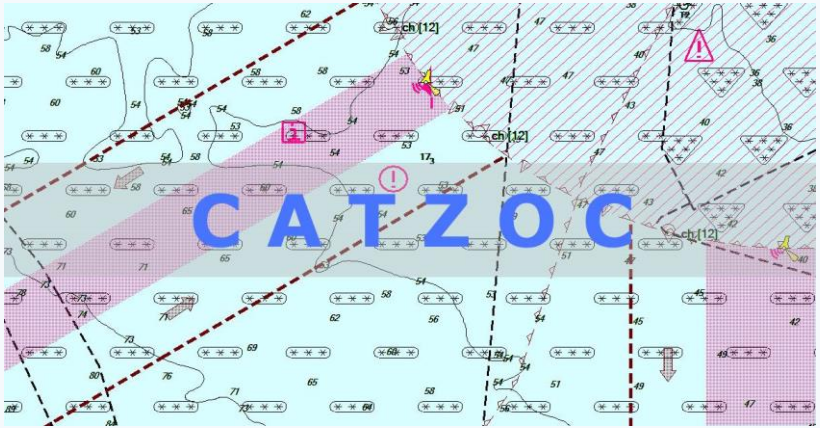
This statement is about a SPECIFIC RESPONSABILITY of HOs and it was endorsed by HSSC and IRCC

HOs scenario

- Overcome the HOs reluctance
- HOs cautios approach
- Not «adequate» data no matter the source
- Lack of resources for data processing and quality assessment

Main questions

- Which data does HOs have in theirs official products?
- Is quality correctly assessed?
- Is CSB better than nothing?
- How to attribute the correct CATZOC?
- Historical data are can be considered as CSB data?



Analysis/Discussion 1/2

- There are approximately 60,000 SOLAS vessels and 130,000 private yachts collecting depth data on a daily basis. This data can have added value to the official products of an HO, especially in remote areas of depth < 100 m.

- New S-44 “International Hydrographic Organization Standards for Hydrographic Surveys, Ed. 2020” considers CSB data as hydrographic data at the disposal of the hydrographer and the cartographer.

Analysis/Discussion 2/2

1. MSs are/are not currently using CSB in their paper or digital charts
   - If yes (1), CATZOC attribution to CSB data
   - If not (1), why MSs are not using CSB
2. MSs using CSB with a “signalling” function (data to be compared with existing data)
3. MSs considering “historical data” as CSB data.

Actions required by MBSHC22

- Note this paper
- Designate a «CSB/Seabed 2030 Ambassador» and inform CSBWG Chair
- Support CSB/Seabed 2030 initiative through the involvement of MSs

Thank you

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