



Crowdsourced Bathymetry

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International Hydrographic Organization
Organisation Hydrographique Internationale

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The IHO Crowdsourced Bathymetry Initiative

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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.





The IHO Crowdsourced Bathymetry Initiative

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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 3.0.0 was published in October 2022.

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).



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



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IHO CL 01/2020 & IRCC CL 21/2020

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

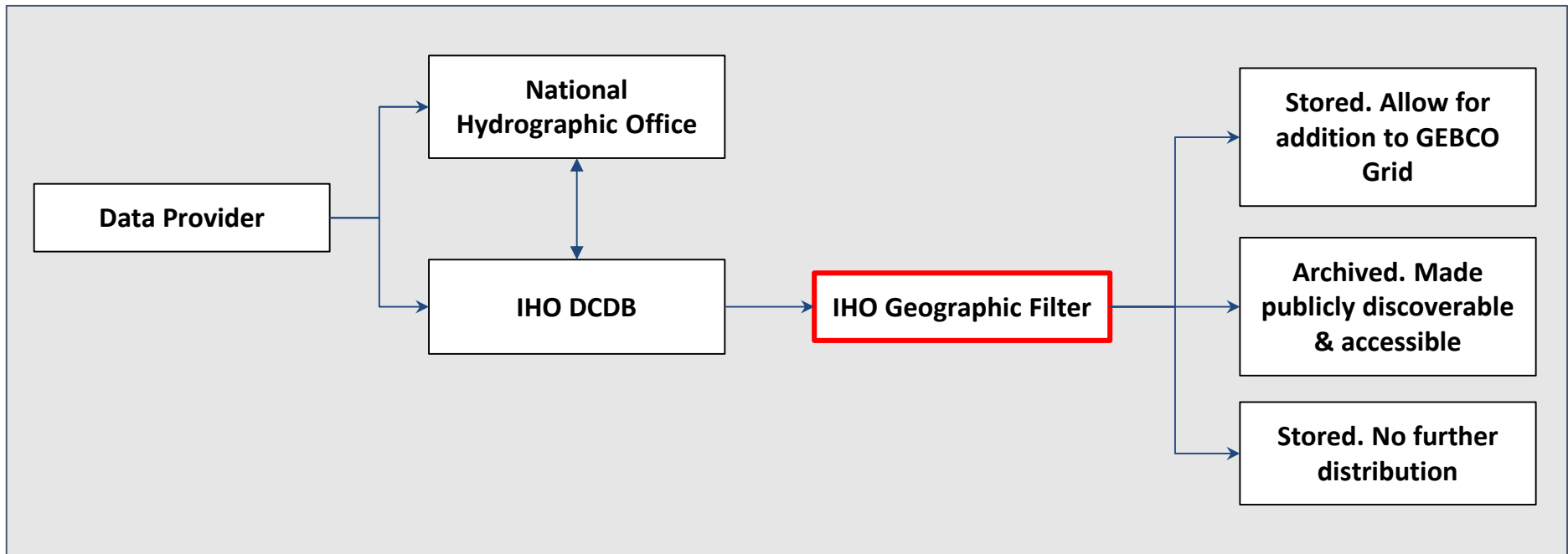




Geographic Filter

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In response to feedback provided to the IHO, the IHO Data Centre for Digital Bathymetry (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.

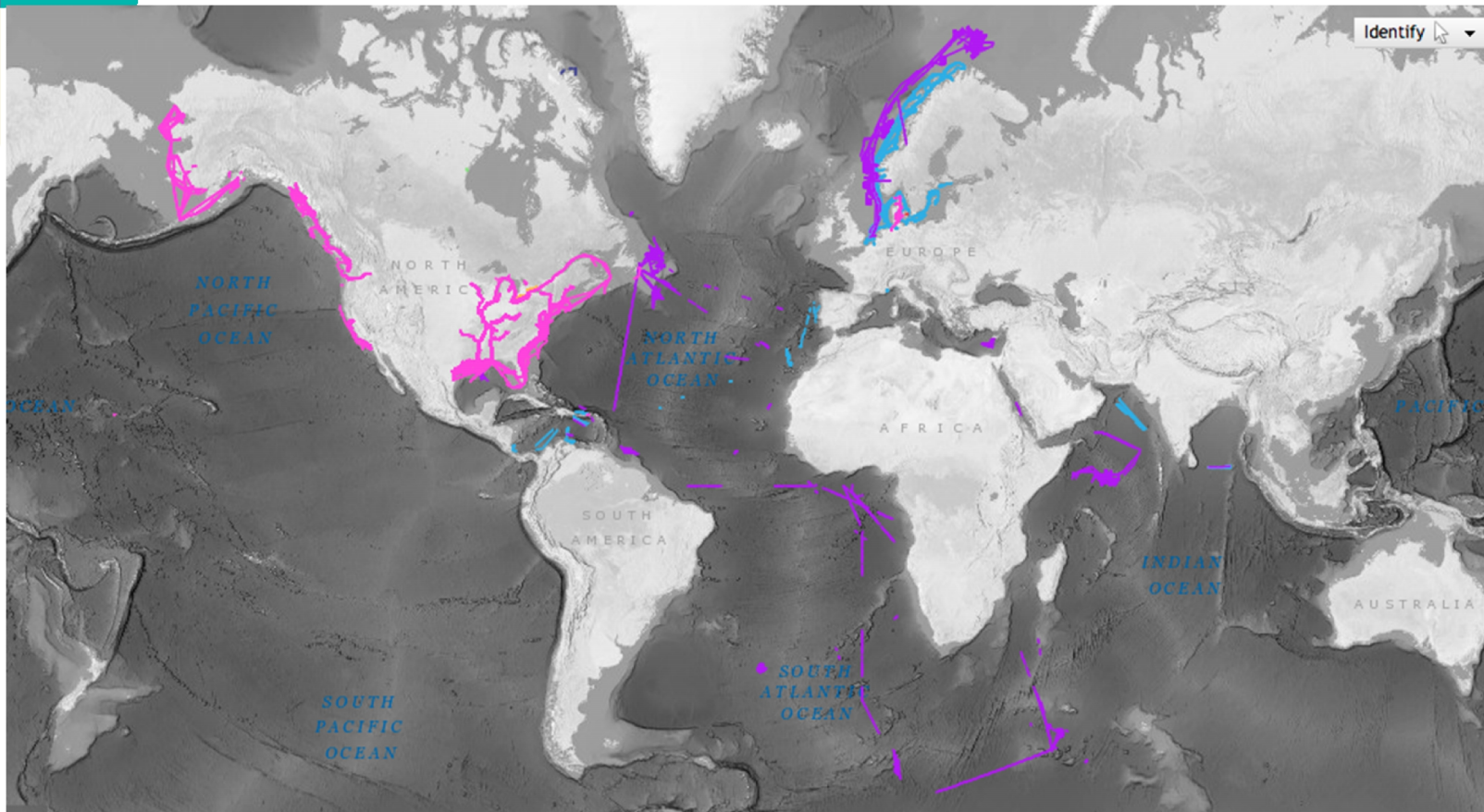




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CSB Data Holdings

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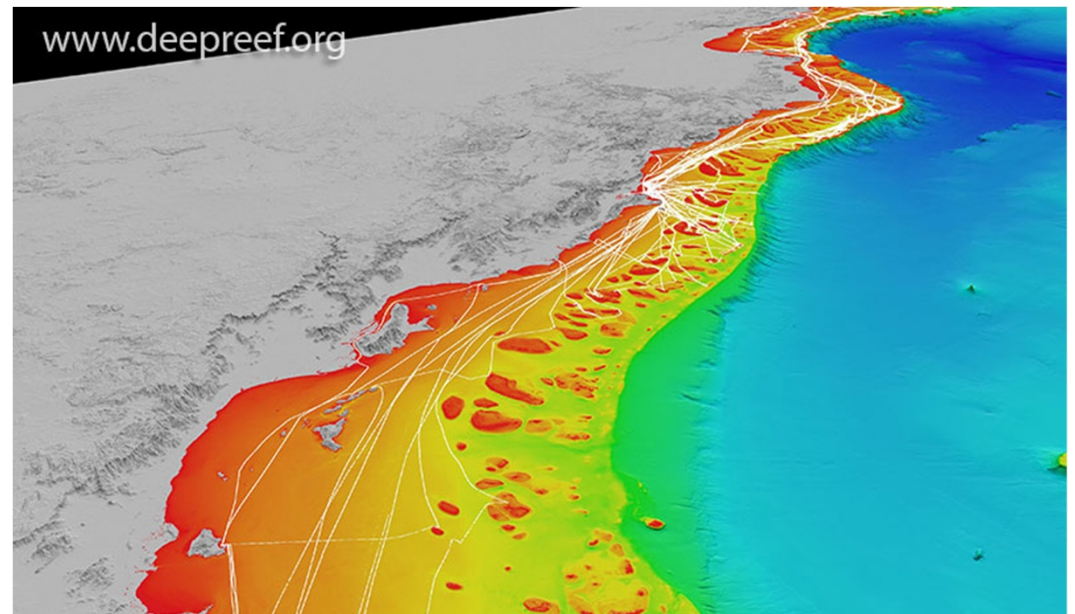


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The Value of CSB Data

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- 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

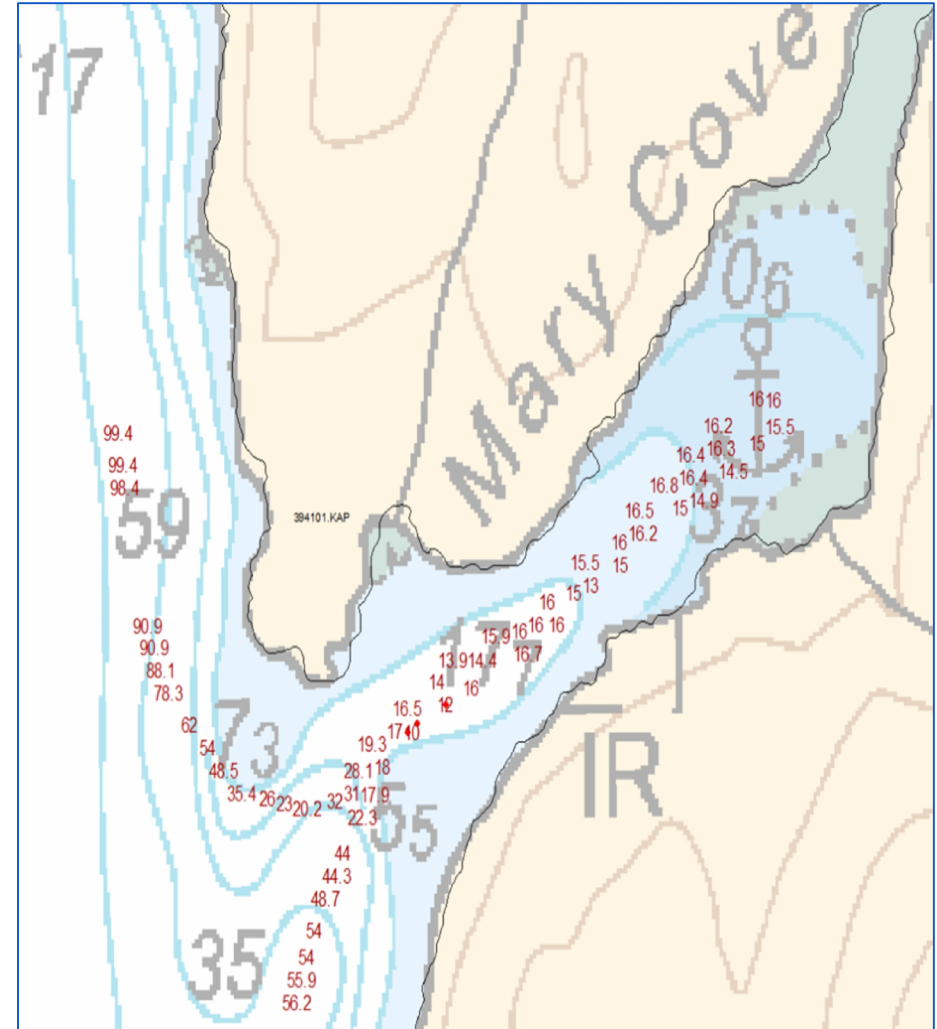


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The Value of CSB Data

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- 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.





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How to Collect & Contribute CSB Data

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- The DCDB accepts CSB contributions through a network of **"Trusted Nodes"**
 - Eg: organizations, companies or universities serving as data liaisons between mariners (data collectors) and the DCDB.
 - Trusted Nodes may supply data logging equipment, provide technical support to vessels, download data from data loggers, and be responsible for data transfer directly to the DCDB.
- *CSB data must be provided in either CSV or GeoJSON, and capture the minimum required information (XYZ, timestamp).*





Current CSB Trusted Nodes

Int
Hy
On

Rose Point Navigation System

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



www.rosepointnav.com



Voyage Data Recorder

Navico C-MAP

- New CSB feed b/w DCDB & navigation software company.

MacGregor/Carnival Cruise Line

- Data provided by Voyage Data Recorders (VDR)

Petroleum Geo-Services (PGS)

- Data feed from PGS vessels to the DCDB

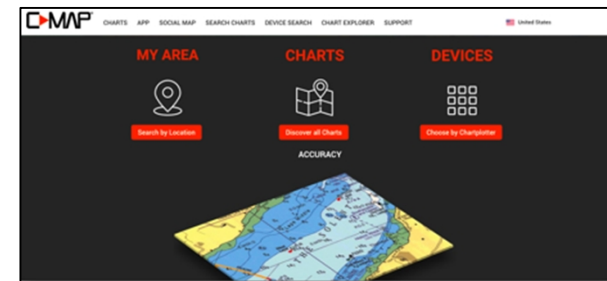


M2Ocean

- Testing data submissions with data collected by Hydroballs (small autonomous bathymetric buoys)

James Cook University

- Distributed data loggers to volunteer vessels along the Great Barrier Reef



SmartLog USB data logger





IHO CSB Working Group

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



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

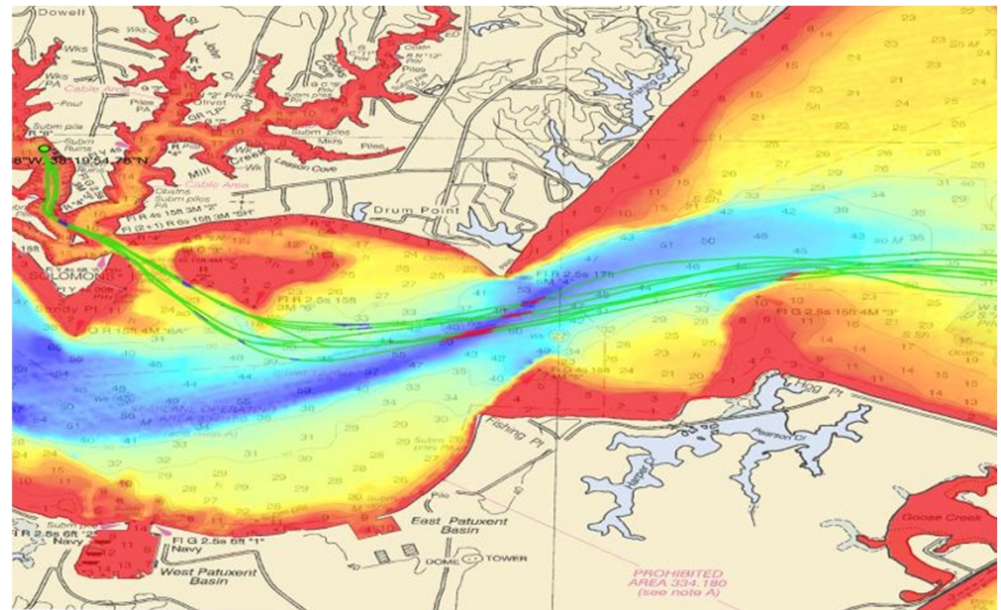


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Potential use-cases of crowdsourced bathymetry with a MSDI perspective

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- Identifying areas of dynamic change for coastal zone management
- Can be used as a layer depicting non-AIS vessel traffic to aid decision-makers
- Reconnaissance data that can start the conversation of where more data is needed and fills in the gaps
- Other?



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.



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How would the MSDIWG envision using CSB?

- It is difficult to imagine a marine spatial data infrastructure without bathymetry!
- Bathymetry is the 3-dimensional framework on which that MSDI places its datasets.
- Like other MSDI datasets, bathymetry is a foundation dataset.
- ***CSB is bathymetry data that may not exist anywhere else and not on hydrographic products because its quality cannot be easily assessed against hydrographic standards in a navigation context.***



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How would the MSDIWG envision collaboration with the CSBWG?

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- Ensure metadata is aligned for easy ingestion and integration into MSDI and for GIS users, in general.
- Stay abreast of formats and developments of CSB best practices and provide guidance.
- Share common challenges in data management and the 'data pipeline'
- Currently, CSB data has no S-100 standard that supports it.





Thank you.

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