

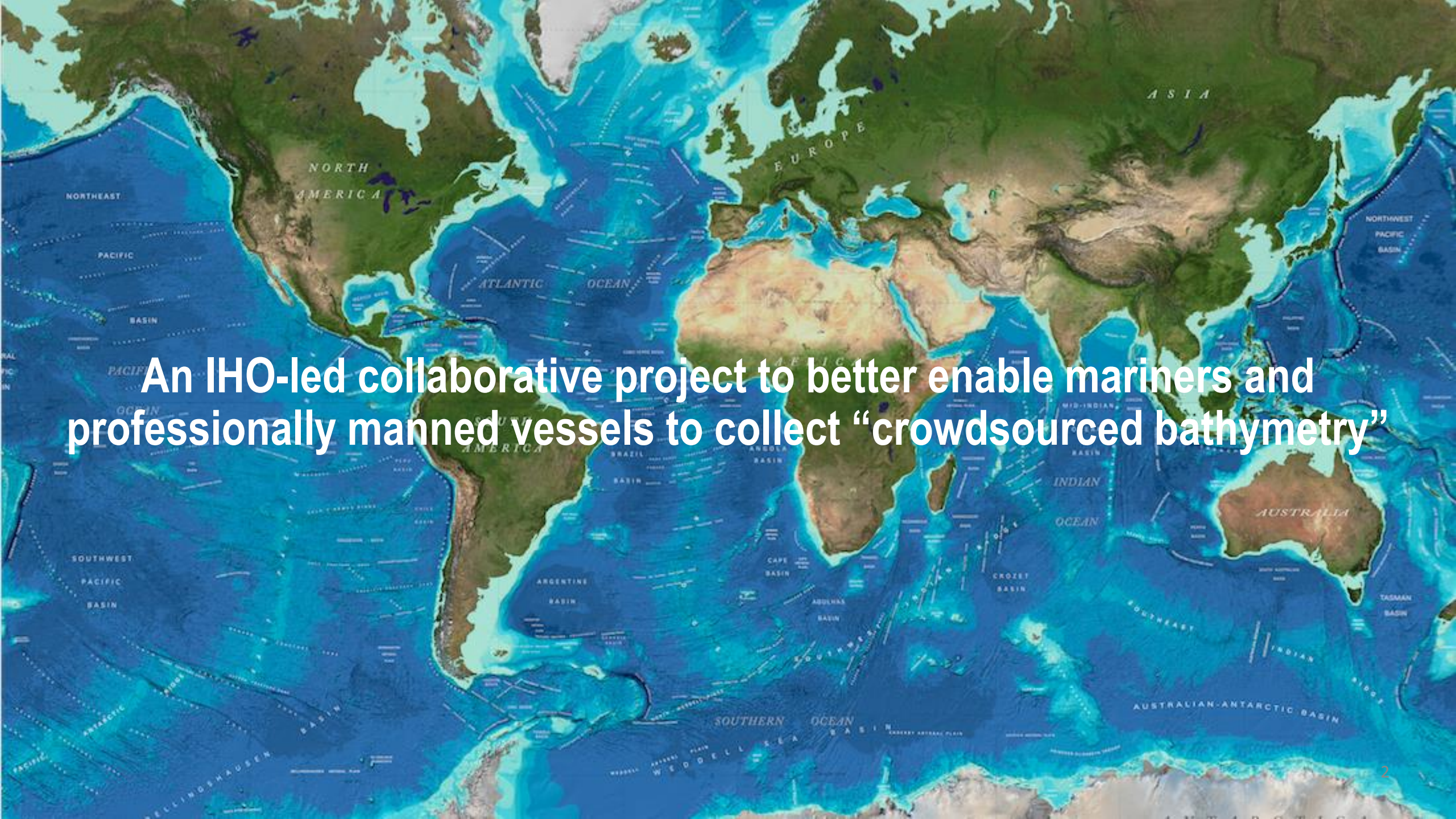


# IHO Crowdsourced Bathymetry Initiative



International Hydrographic Organization  
*Organisation Hydrographique Internationale*





An IHO-led collaborative project to better enable mariners and professionally manned vessels to collect "crowdsourced bathymetry"



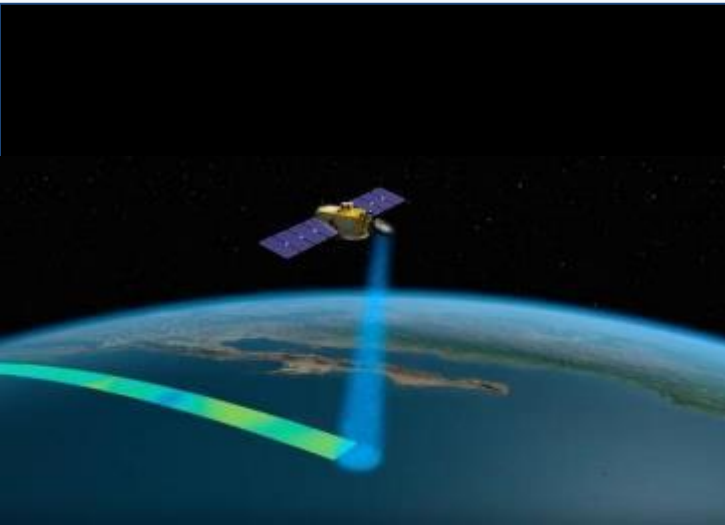


**Crowdsourced bathymetry (CSB) is the collection of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations.**



# For what can depth information be used?

- Nautical charts
- Oil, gas, & mineral exploration
- Safety and storm surge/tsunami inundation models
- Ecosystem identification and management
- Emergency response
- Satellite verification models
- Ocean circulation/pollution models
- Coastal and Marine Spatial Planning
- Coastal Hazard Assessment
- Ocean Exploration
- Coastal Change Analysis
- Sea Level Rise Mitigation
- New Energy Siting
- Marine heritage
- Climate modeling



# Global Initiatives



UN's 2030 Agenda for Sustainable Development Goals



Seabed 2030



The Paris Agreement under the UN Framework Convention on Climate Change



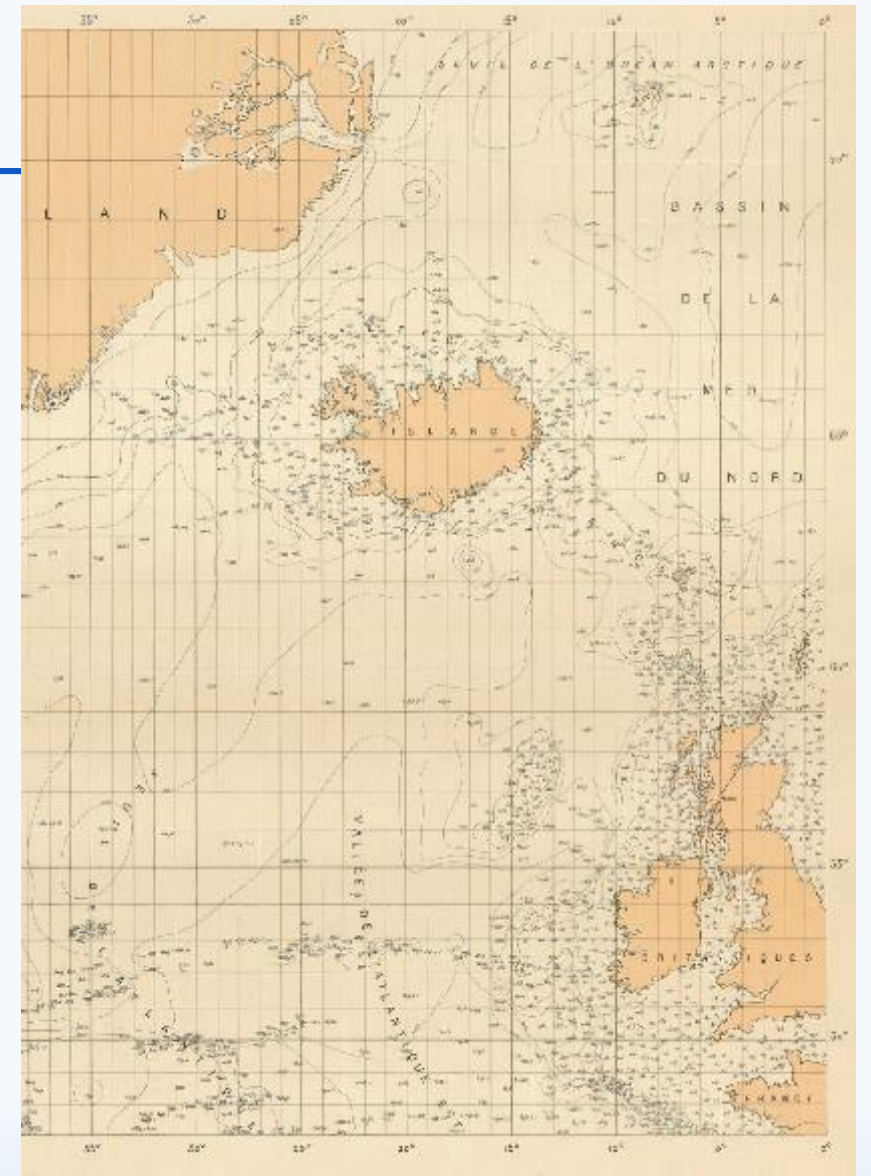
The Sendai Framework for Disaster Risk Reduction 2015-2030





# The IHO & GEBCO

- The IHO has a long history of encouraging the collection of CSB to help improve mankind's understanding of the shape and depth of the seafloor.
- The General Bathymetric Chart of the Ocean (GEBCO) project was initiated in 1903 by Prince Albert I of Monaco to provide the most authoritative, publicly-available bathymetry of the world's oceans.
- The GEBCO Project, now jointly overseen by the IHO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, has produced maps of the ocean floor from depth measurements collected by vessels as they journeyed across the oceans.



Part of GEBCO Sheet B1, from 1st Edition 1903. Source: IHO archive



# The IHO & GEBCO

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Systematic surveys are now routinely used to improve the maps and grids.

However, “passage soundings” continue to play an important role in enabling the creation of progressively more-detailed seafloor maps and digital data grids.



*GEBCO\_2014 World Map*





# The IHO & GEBCO

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- < 15% of the world's ocean depths have been measured
- ~50% of the world's coastal waters shallower than 200 metres remain unsurveyed.
- The rest of the data used to compile seafloor maps are inferred depths from satellite observations.



Global Multi-Resolution Topography (GMRT) Synthesis,  
doi:10.1029/2008GC002332





# 5th Extraordinary International Hydro Conf

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In 2014, the IHO, at its EIHC5, initiated a collaborative project to better enable mariners and professionally manned vessels to collect “crowdsourced bathymetry” (CSB)

The Inter-Regional Coordination Committee (IRCC) was tasked to establish a working group to prepare a new IHO publication on policy for CSB.



The IHO Crowdsourced Bathymetry Working Group has since developed IHO publication B-12 *IHO Guidance on Crowdsourced Bathymetry* to state its policy towards, and provide best practices for collecting CSB.





# IHO CSB Working Group

- Representatives from 12 Member States  
Canada, Italy, Nigeria, Norway, Philippines, Denmark,  
Finland, France, Germany, India, Portugal, and USA
- Observers and expert contributors from TeamSurv,  
Olex, Sea-ID, GMATEK, Inc./World Maritime  
University, and SevenC's
- Former IHO Secretary General Robert Ward, IHO  
Secretary General Mathias Jonas and Assistant  
Director David Wyatt



CSBWG2: 10-11 Jan 2016 - Boulder, CO



CSBWG5: 5-6 Dec 2017 - IHO, Monaco



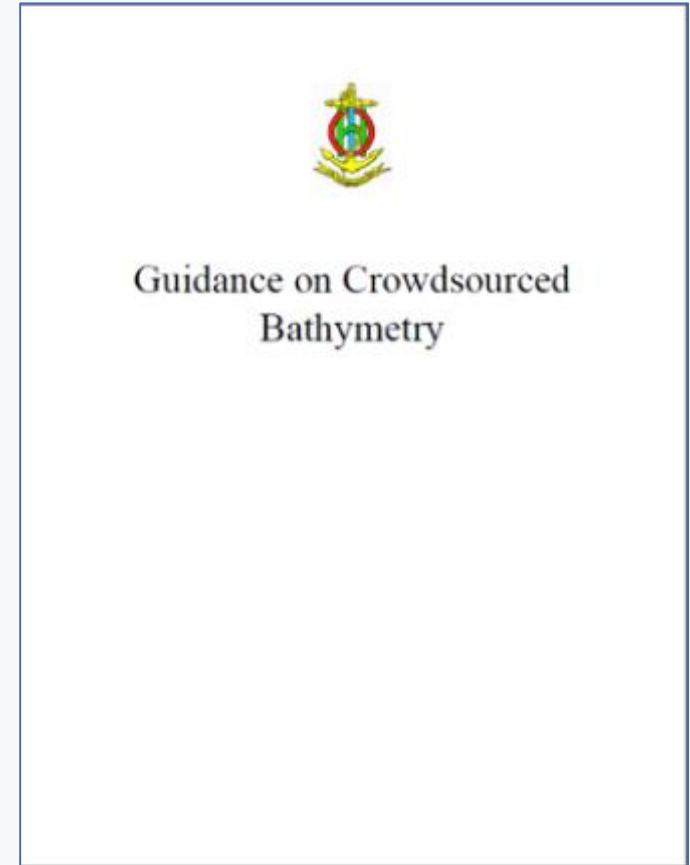


# IHO CSB Working Group

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The working group has developed ***B-12 IHO Guidance on Crowdsourced Bathymetry*** to state the IHO's policy towards, and provide best practices for collecting, crowdsourced bathymetry.

This document provides guidance on the collection and assessment of CSB data for inclusion in the global bathymetric data set which is maintained in the IHO Data Centre for Digital Bathymetry (DCDB).



To access the document:  
[https://www.iho.int/iho\\_pubs/IHO\\_Download.htm](https://www.iho.int/iho_pubs/IHO_Download.htm)





# IHO DCDB Enhancements & Pilot Project

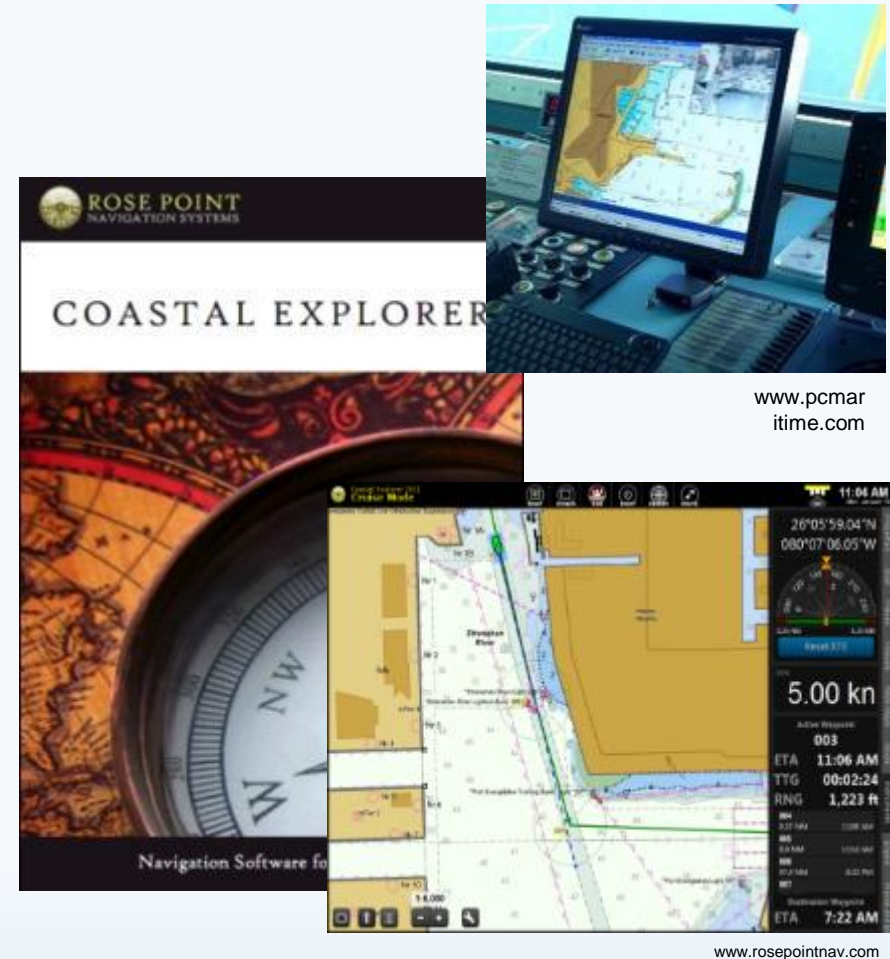
For the last several years, the IHO Data Centre for Digital Bathymetry (DCDB), working in collaboration with the CSB Working Group, has worked on enhancing its infrastructure to allow the public to upload, discover, display and download CSB data via a web-based interface.

[https://maps.ngdc.noaa.gov/viewers/iho\\_dcdb/](https://maps.ngdc.noaa.gov/viewers/iho_dcdb/)



# IHO DCDB Enhancements & Pilot Project

- IHO DCDB and NOAA teamed up with Rose Point Navigation Systems
- Mariners given an option to enable CSB logging, allowing a modified ECS log file to record position, depth and time.
- Mariners can choose to be anonymous or to submit metadata about vessel and equipment
- The ECS software transmits the data via HTTPS post when the mariner updates the software or chart catalog





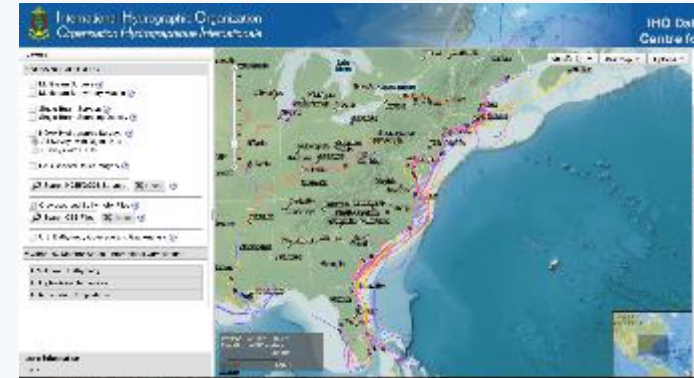
# IHO DCDB Enhancements & Pilot Project

*Data discovery and access via our map viewer.  
Data delivered as a collection of files.*

```
{  
  "platform":  
  {  
    "uniqueID": "ROSEP-e8c669f8-df38-16e5-b86d-9a79606e9478",  
    "type": "Ship",  
    "name": "SS Dinghy",  
    "length": 65,  
    "lengthUnitOfMeasure": "meters",  
    "IDType": "IMO",  
    "IDNumber": "1008140"  
  }  
}
```

**CSB data log file (with JSON metadata string)**

```
lat,lon,depth,time  
47.666520,-122.098525,21.49,20161017T234638Z  
47.666518,-122.098525,11.98,20161017T234739Z  
47.666517,-122.098527,14.63,20161017T234839Z  
47.666515,-122.098527,17.16,20161017T234935Z  
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47.666505,-122.098522,20.18,20161017T235141Z  
47.666477,-122.098507,20.42,20161017T235241Z  
47.666512,-122.098432,20.63,20161017T235342Z  
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47.666512,-122.098470,20.33,20161017T235548Z  
47.666507,-122.098490,20.57,20161017T235644Z  
47.666533,-122.098453,20.33,20161017T235832Z  
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47.666490,-122.098562,10.06,20161018T000638Z  
47.666490,-122.098560,12.65,20161018T000738Z  
47.666492,-122.098552,15.88,20161018T000839Z  
47.666487,-122.098527,18.32,20161018T000939Z  
47.666398,-122.098182,20.12,20161018T001038Z  
47.666393,-122.098185,20.30,20161018T001045Z  
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47.666378,-122.098185,20.70,20161018T001047Z
```



**Data and identifying token are submitted to DCDB via HTTP post**

**Frequent update of viewer**



# IHO DCDB CSB Data Holdings

- 117 million soundings
- 110 contributing vessels
- 3435 data deliveries



[https://maps.ngdc.noaa.gov/viewers/iho\\_dcdb/](https://maps.ngdc.noaa.gov/viewers/iho_dcdb/)





# The Role of CSB Data

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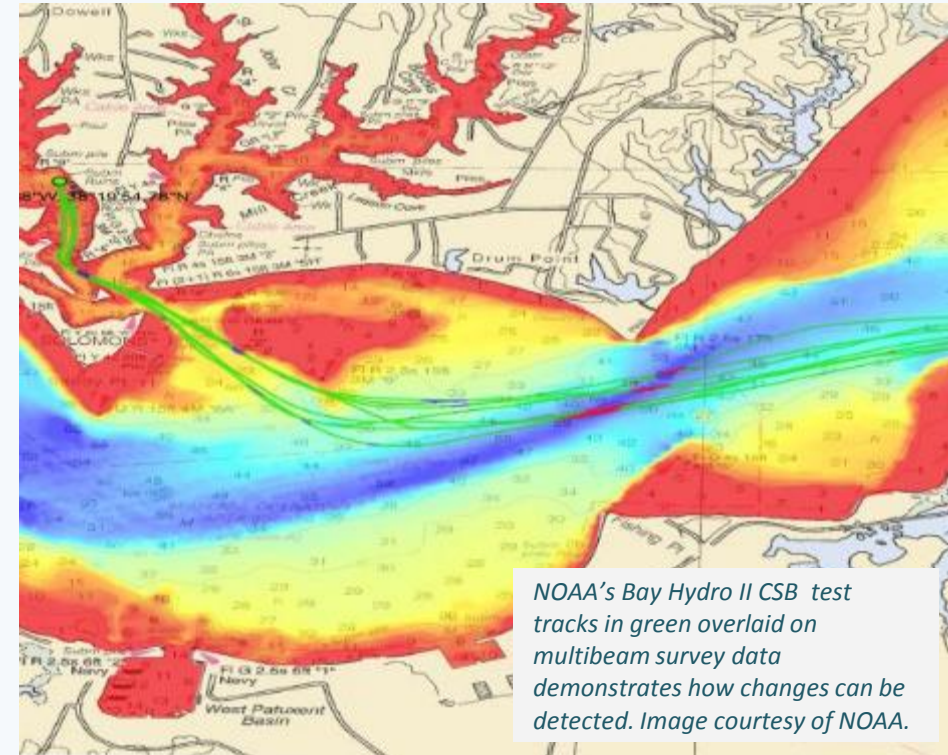
While CSB data may not meet accuracy requirements for charting areas of critical under-keel clearance, it holds limitless potential for myriad other uses.

CSB is a powerful source of information to supplement the more rigorous and scientific bathymetric coverage done by hydrographic offices, industry, and researchers around the world.



# The Role of CSB Data

- Support national and regional development activities
- Fill gaps where data is scarce (eg: Arctic, SIDS, open ocean)
- Useful along shallow, complex coastlines that are difficult for traditional survey vessels to access (areas that may be more frequently visited by recreational boaters)
- Identify uncharted features
- Assist in verifying charted information
- Confirm whether charts are appropriate for the latest traffic patterns.





# CSB Data Use Cases

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# CSBWG Next Steps

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- Increase awareness
- Increase data contributions
- Develop incentives on how and why to become involved in the initiative
- Identify potential uses of CSB data
- Provide guidance on data quality and standards for CSB for potential future use
- Liaise with industry, organizations and IHO bodies involved with and potential uses of CSB data.

“If we got 1% of all seagoing vessels logging data, and on average they spent half their time at sea, then that’s about 5 billion data points a day.”

- Tim Thornton, TeamSurv

