



IHO Data Center for Digital Bathymetry

An update

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International
Hydrographic
Organization

23rd - 25th April 2024
Monaco

IHO CSB Working Group 15



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Today's Talk

International
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The Role of the DCDB

Data Providers and Metrics

Data Access and Discovery

Recent Improvements

Ongoing and Planned Enhancements





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Or

- The IHO DCDB is the recognized IHO repository for all ocean bathymetric data.
- Data are sent to the IHO DCDB, where we provide preservation, discovery and access.
- NOAA has hosted the DCDB since 1990.
- **May 2023: An MOU was signed to reaffirm NOAA's relationship with the IHO as the host of the IHO DCDB**

IHO DCDB Home Contribute Data Crowdsourced Bathymetry CSB Mapping Projects

IHO Data Centre for Digital Bathymetry (DCDB)

The IHO DCDB was established in 1990 to steward the worldwide collection of bathymetric data. The Centre archives and shares, freely and without restrictions, depth data contributed by mariners. 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 30 terabytes of oceanic depth soundings acquired with multibeam and singlebeam sonars by hydrographic, oceanographic and industry vessels during surveys or while on passage.

The DCDB also archives and provides access to data contributed in support of the [IHO Crowdsourced Bathymetry \(CSB\)](#) initiative.

The [IHO DCDB Data Viewer](#) shows the global coverage of the DCDB's bathymetric data holdings as well as the spatial extent of data archived at other repositories via web services.

[Access Data](#)

ngdc.noaa.gov/iho/

During the IHO Assembly, the signing of the MoU was recognized by Dr. Mathias Jonas and RDML Ben Evans



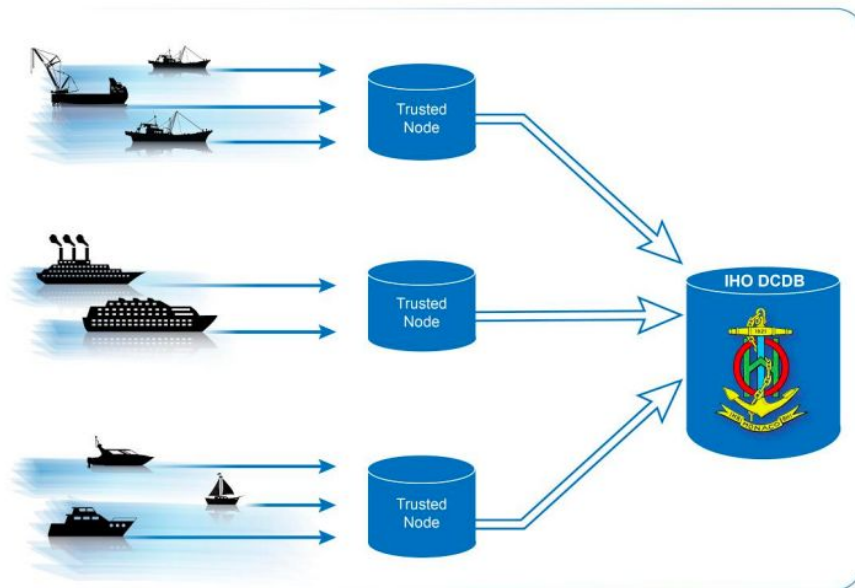


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CSB Data Flow (Ideal Scenario)

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The DCDB accepts CSB contributions through a network of "**Trusted Nodes**"





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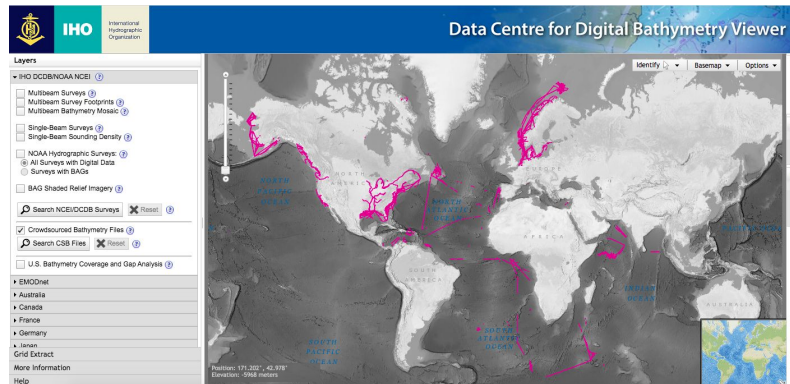
CSB Data Flow (Ideal Scenario)

```
{
  "crs": {
    "horizontal": {
      "type": "EPSG",
      "value": 4326
    },
    "vertical": "Transducer"
  },
  "providerContactPoint": {
    "orgName": "Example Cruises Inc",
    "email": "support@example.com",
    "logger": "Rose Point ECS",
    "loggerVersion": "1.0"
  },
  "convention": "XYZ CSB 3.0",
  "dataLicense": "CC0 1.0",
  "platform": {
    "uniqueID": "EXAMPLE-f8c469f8-df38-11e5-b86d-9a79f06e9478",
    "correctors": {
      "positionReferencePoint": "GNSS"
    }
  }
}
```

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

```
2020-02-25T01:08:06Z
2020-02-25T01:08:07Z
68.498965, 15.832905, 61.3, 2020-02-25T01:08:11Z
68.498655, 15.833184, 61.3, 2020-02-25T01:08:15Z
68.498592, 15.833239, 61.3, 2020-02-25T01:08:16Z
68.498213, 15.833567, 55.3, 2020-02-25T01:08:23Z
68.49815, 15.833622, 55.3, 2020-02-25T01:08:24Z
68.49815, 15.833622, 55.3, 2020-02-25T01:08:24Z
68.497713, 15.83401, 54.3, 2020-02-25T01:08:30Z
68.497399, 15.834287, 53.3, 2020-02-25T01:08:35Z
68.497399, 15.834287, 53.3, 2020-02-25T01:08:36Z
68.497336, 15.834341, 53.3, 2020-02-25T01:08:36Z
68.497147, 15.834506, 59.3, 2020-02-25T01:08:39Z
68.497147, 15.834506, 59.3, 2020-02-25T01:08:40Z
68.497084, 15.83456, 59.3, 2020-02-25T01:08:40Z
68.496959, 15.83467, 59.3, 2020-02-25T01:08:43Z
68.496897, 15.834725, 59.3, 2020-02-25T01:08:44Z
68.496897, 15.834725, 59.3, 2020-02-25T01:08:44Z
68.496708, 15.83489, 54.3, 2020-02-25T01:08:47Z
68.496708, 15.83489, 54.3, 2020-02-25T01:08:47Z
68.496646, 15.834946, 54.3, 2020-02-25T01:08:48Z
68.496457, 15.835112, 49.3, 2020-02-25T01:08:50Z
68.496457, 15.835112, 49.3, 2020-02-25T01:08:51Z
68.496205, 15.835332, 53.3, 2020-02-25T01:08:55Z
68.496143, 15.835387, 53.3, 2020-02-25T01:08:55Z
```

Data discovery and access via map viewer.



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

**Frequent update of
viewer**



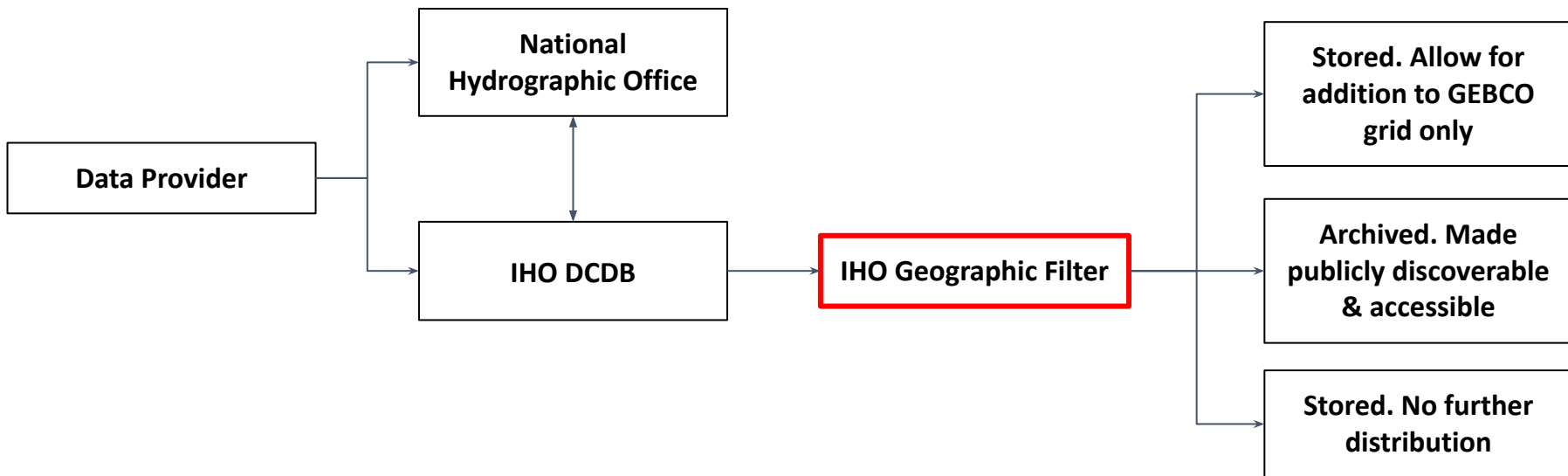


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Geographic Filter

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In response to feedback provided to the IHO, 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.

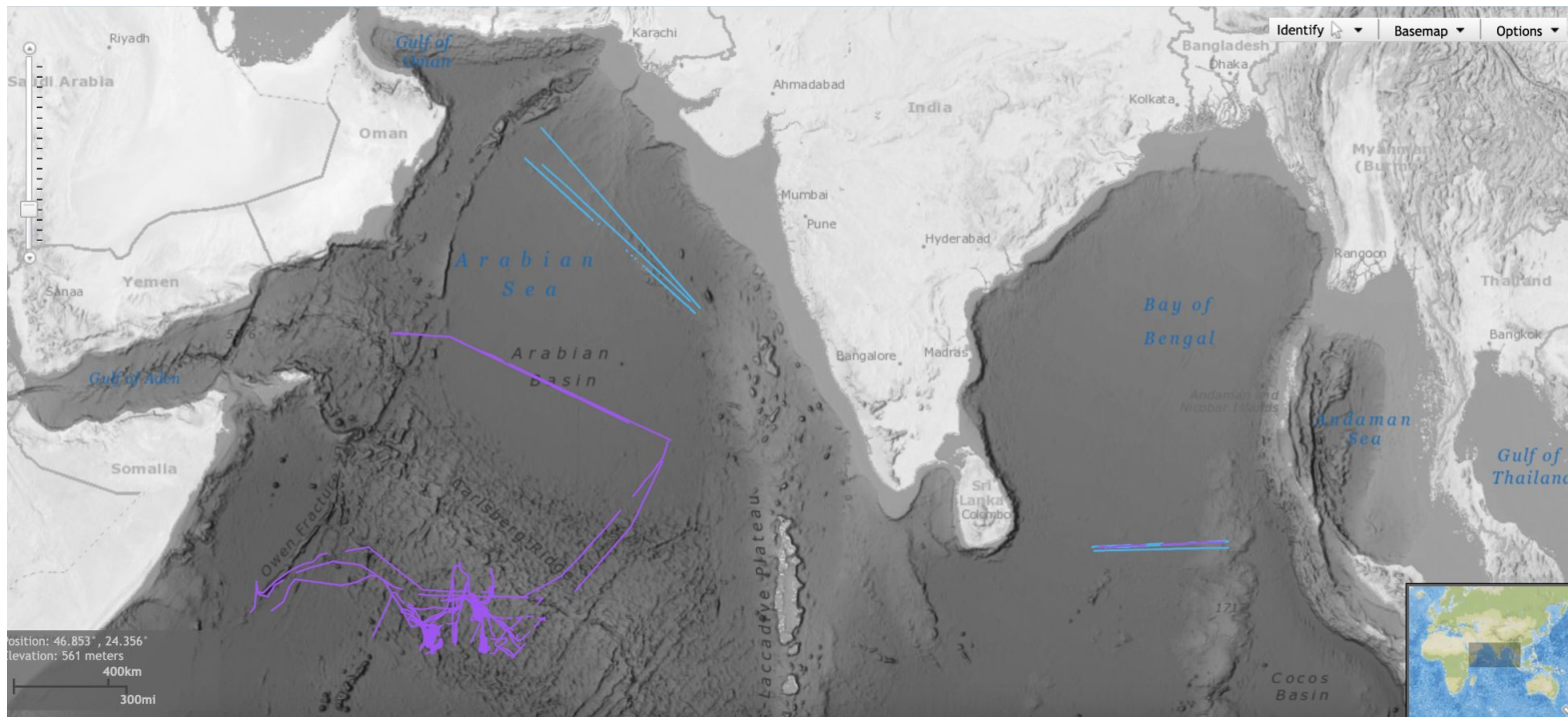




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Geographic Filter

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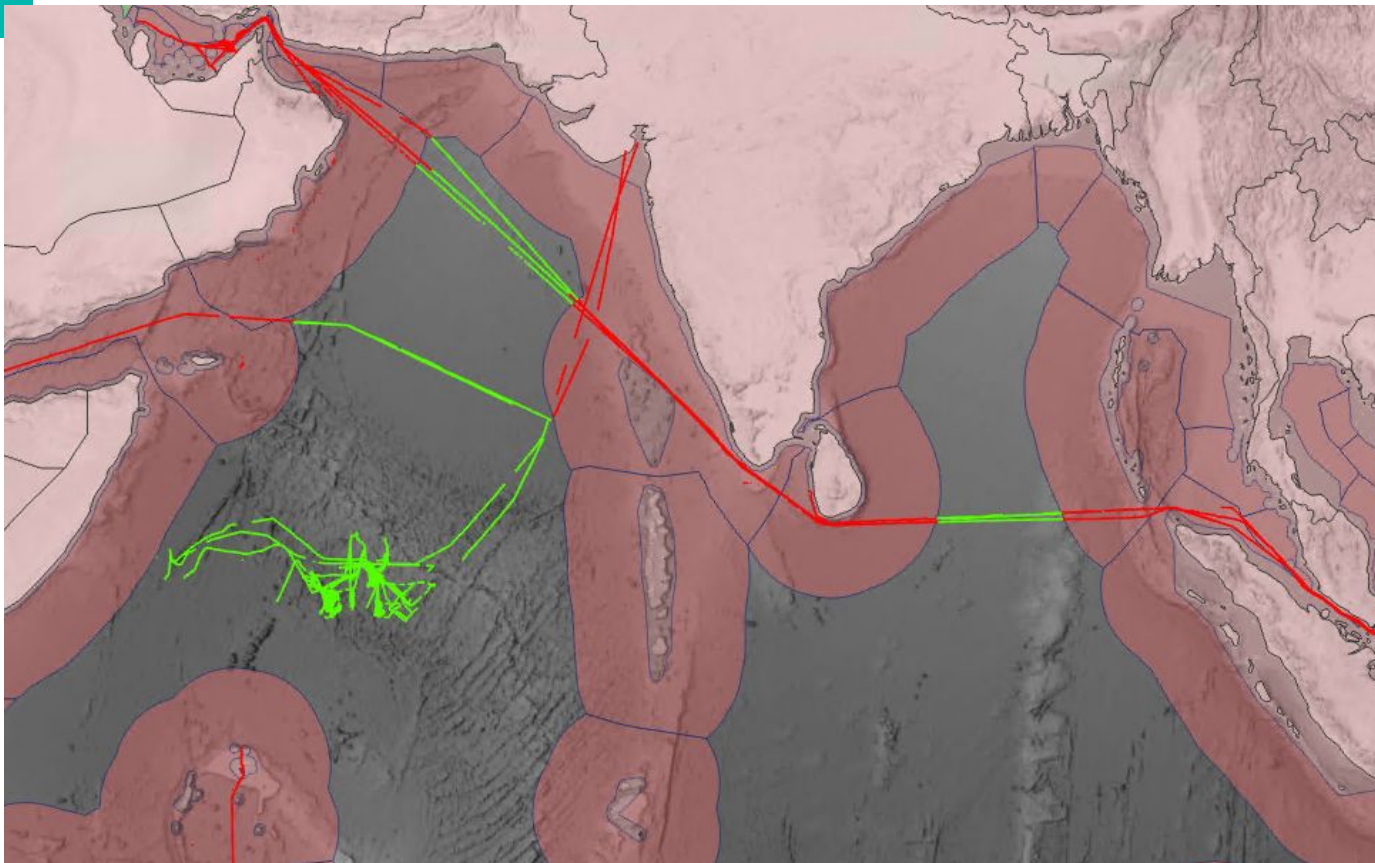




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Geographic Filter

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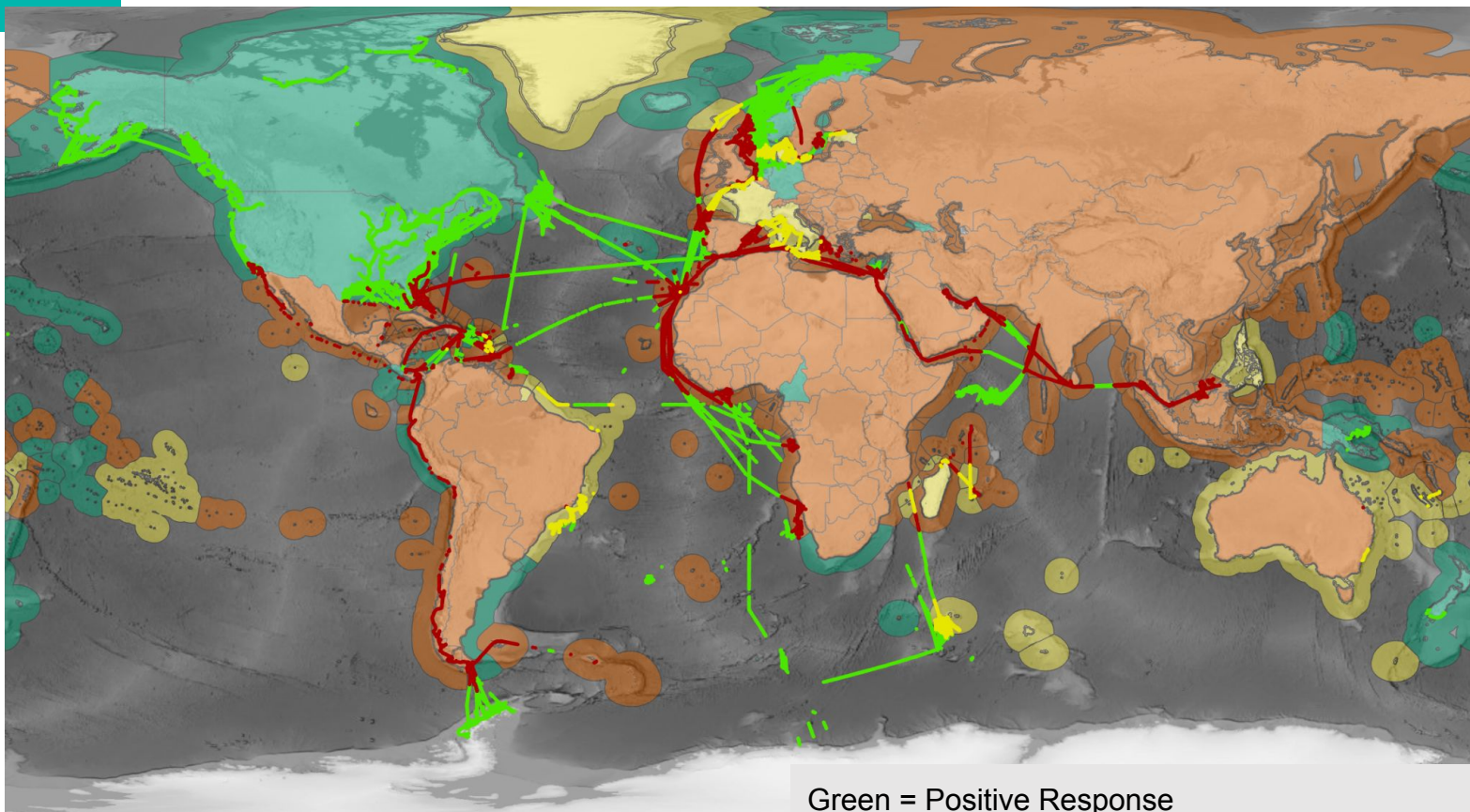
Map for illustrative purposes only. (Credit: Marine Regions)



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Geographic Filter

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Green = Positive Response
Yellow = Positive Response w/ caveats unable to adhere to
Red = Negative Response, No Response

Map for illustrative purposes only, Nov 2023. (Credit: Marine Regions)



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Ongoing and Planned Enhancements

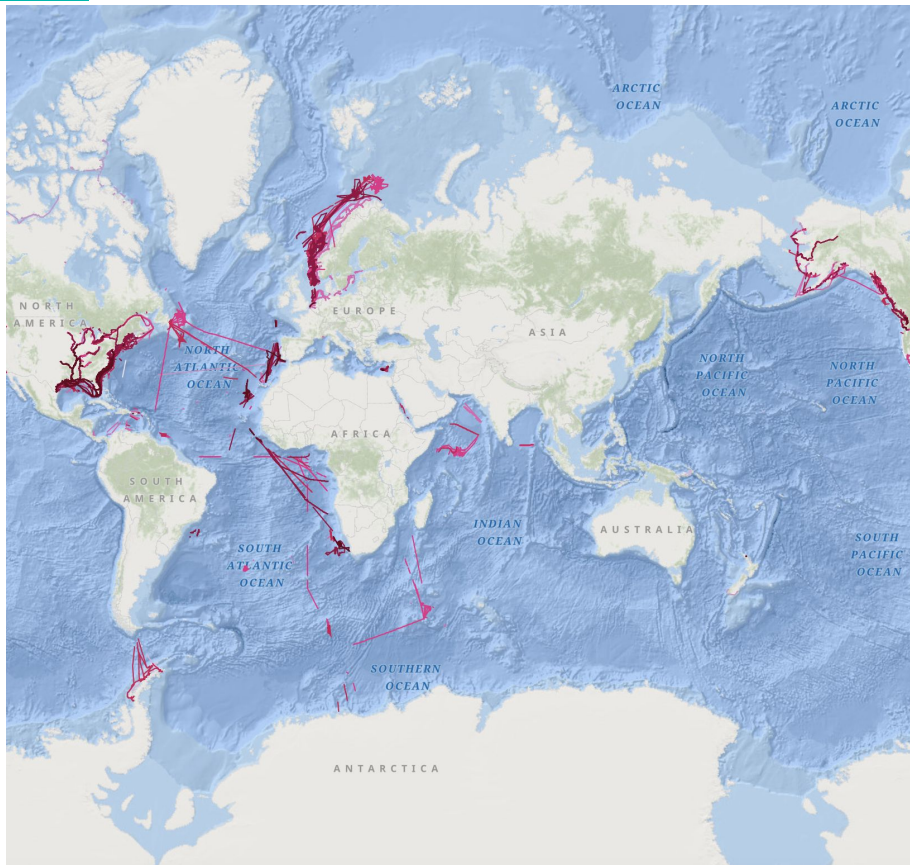




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Current Trusted Nodes

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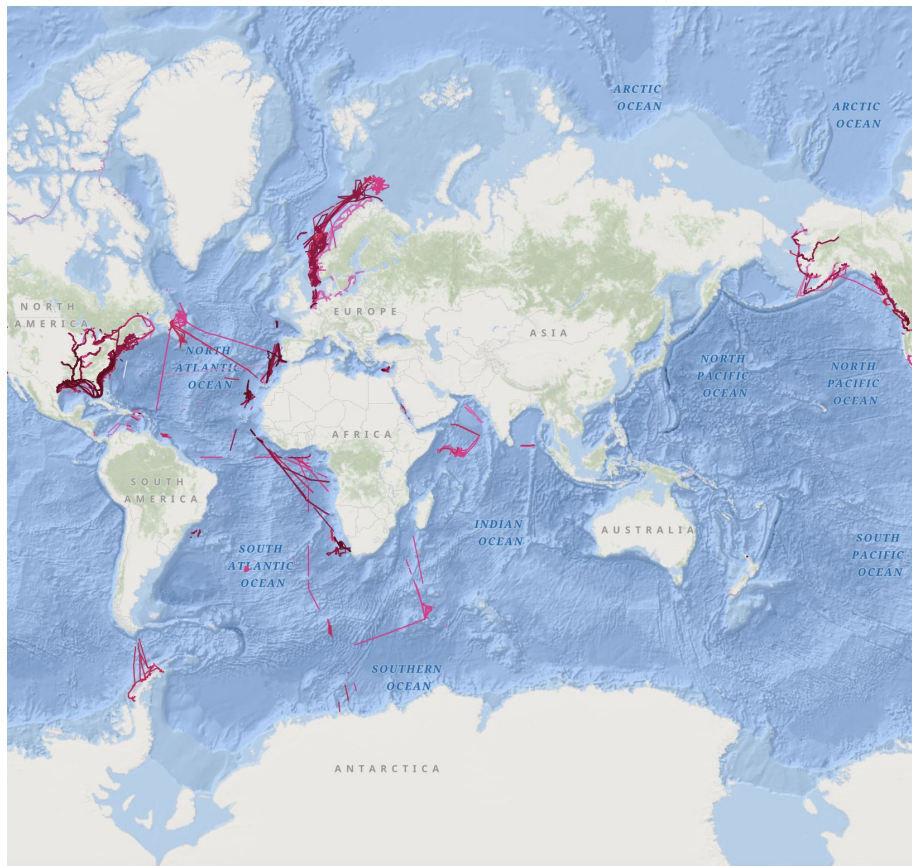
- Publicly available data:
 - AquaMap
 - CIDCO
 - FarSounder Inc.
 - GLOS
 - M2Ocean
 - MacGregor Germany/Carnival Cruise Line
 - Orange Force Marine (OFM)
 - Petroleum Geo-Services (PGS)
 - Rosepoint Navigation Systems
 - Seabed 2030
 - SeaKeepers
 - COMIT
- In Process:
 - Alcatel Submarine Network
 - Docktech
 - James Cook University
 - Navico C-MAP
 - NOAA
 - UNHJHC



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CSB Data Holdings

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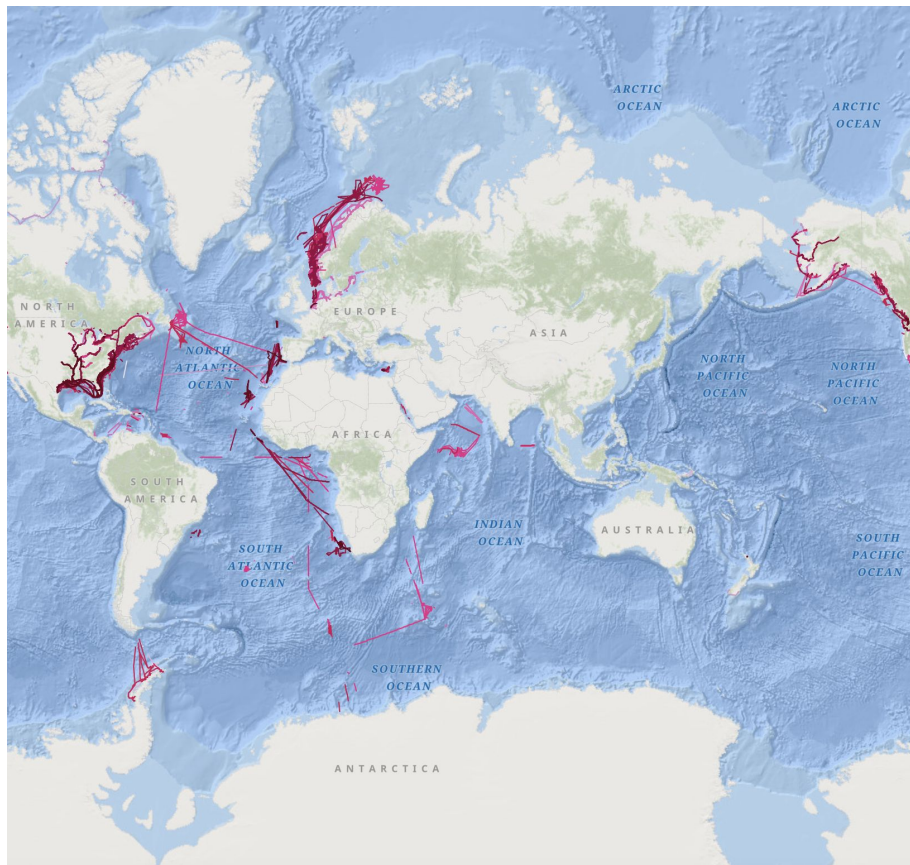
1,008,164,463 points!!!



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CSB Data Holdings

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- 31.5 GB from 13 trusted nodes currently publicly accessible
 - 89% from Rose Point
 - 369 vessels, including 'Anonymous' (up from 257 at CSBWG13)
 - 272 vessels associated with Rose Point
- Additional 6.2 GB filtered based on responses to IHO C/L



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Data Access - DCDB Viewer

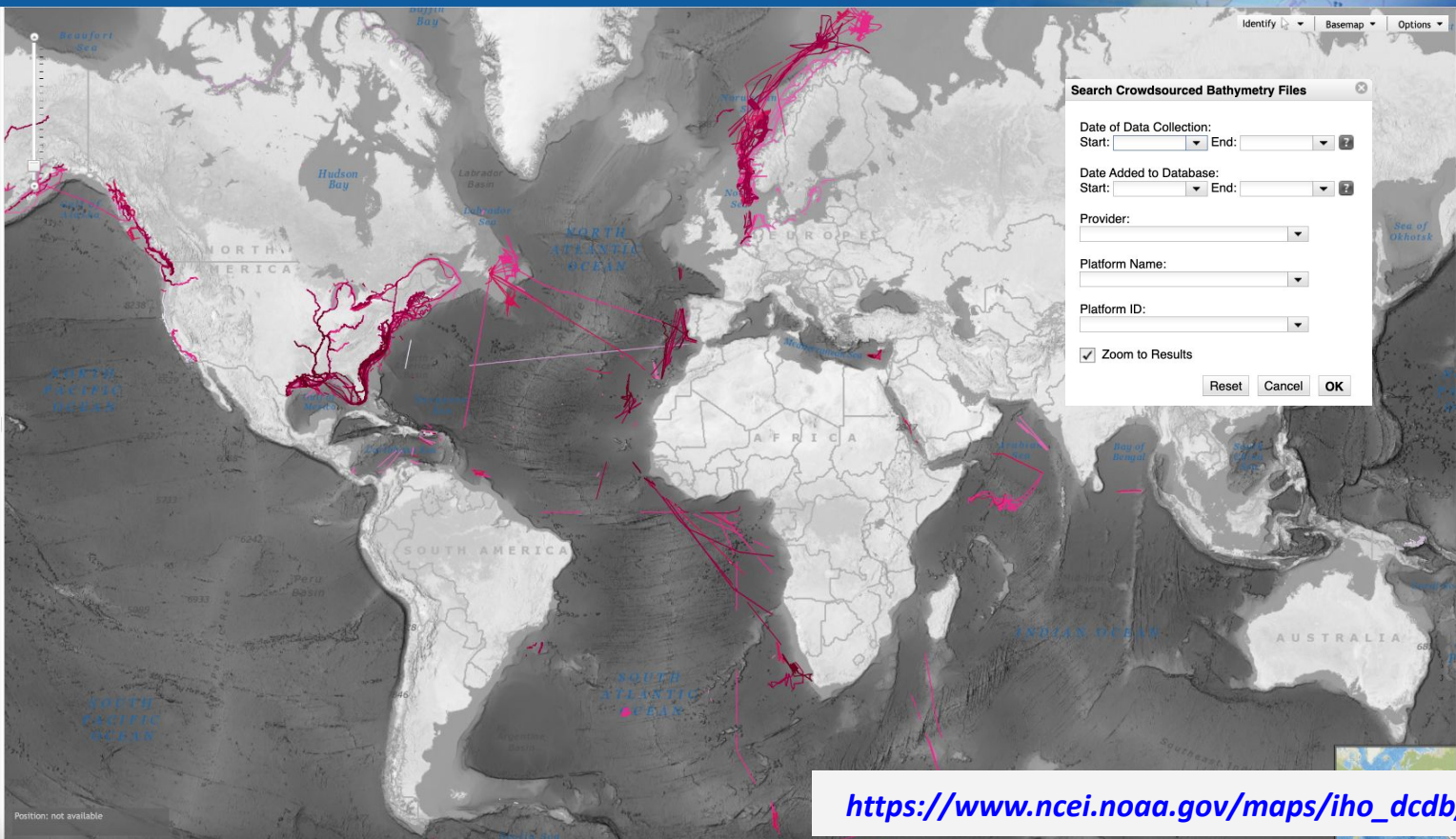
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Data Centre for Digital Bathymetry Viewer

Layers

- IHO DCDB/NOAA NCEI (?)
- Multibeam Surveys (?)
- Multibeam Survey Footprints (?)
- Multibeam Bathymetry Mosaic (?)
- Single-Beam Surveys (?)
- Single-Beam Sounding Density (?)
- NOAA Hydrographic Surveys: (?)
 - All Surveys with Digital Data
 - Surveys with BAGs
- BAG Shaded Relief Imagery (?)
- (?)
- Crowdsourced Bathymetry Files (?)
- (?)
- U.S. Bathymetry Coverage and Gap Analysis (?)
- EMODnet
- Australia
- Canada
- Cape Verde
- France
- Germany
- Japan
- Netherlands
- New Zealand
- Norway
- Portugal
- United Kingdom
- Other Data Sources
- Known Non-Public Data (?)
- Bathymetric Coverage Maps



Search Crowdsourced Bathymetry Files

Date of Data Collection:
Start: End: (?)

Date Added to Database:
Start: End: (?)

Provider:

Platform Name:

Platform ID:

Zoom to Results

Grid Extract
More Information
Help

Position: not available

https://www.ncei.noaa.gov/maps/iho_dcdb/



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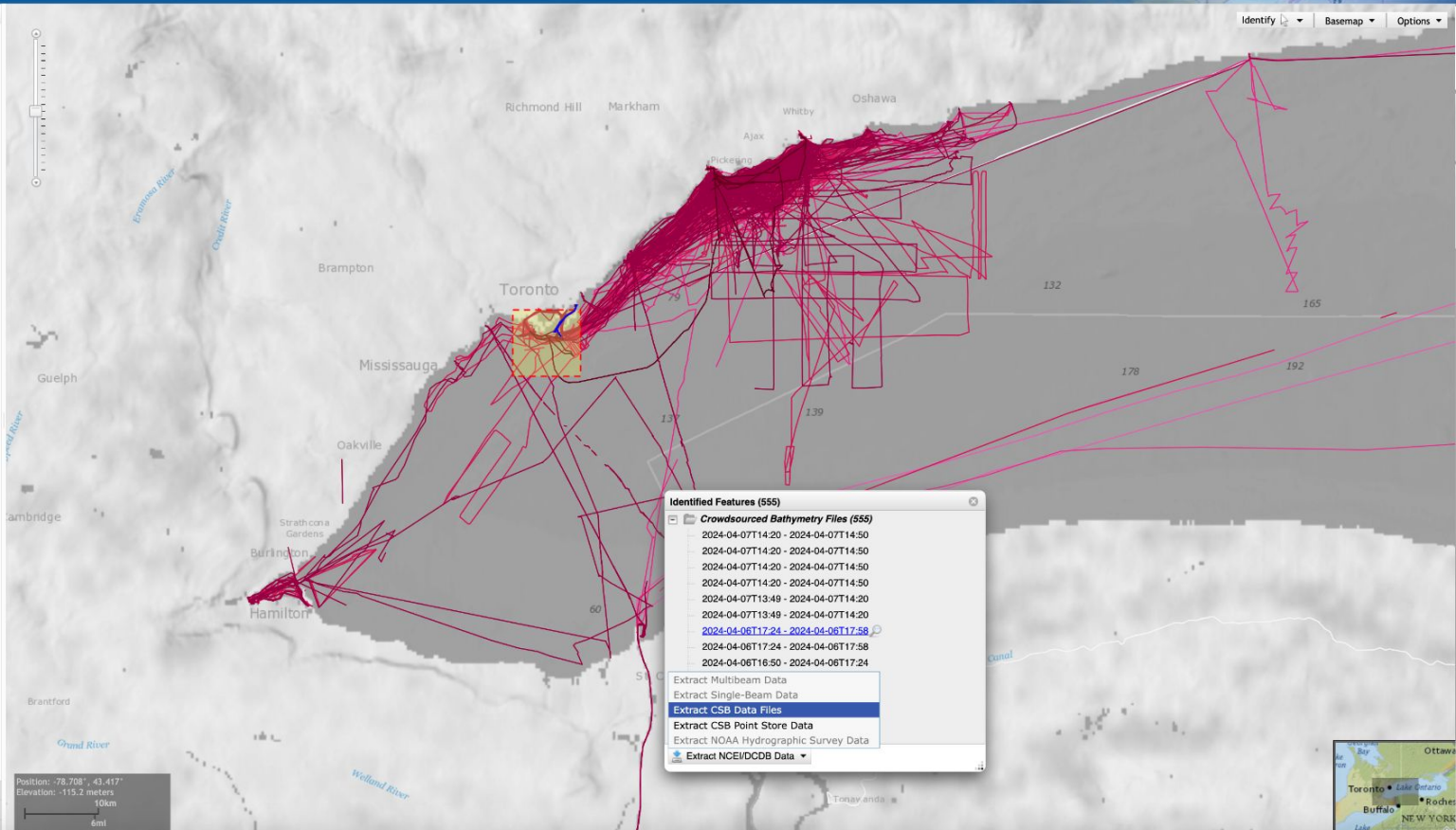
Data Access - DCDB Viewer

Data Centre for Digital Bathymetry Viewer



Layers

- ▼ IHO DCDB/NOAA NCEI (?)
 - Multibeam Surveys (?)
 - Multibeam Survey Footprints (?)
 - Multibeam Bathymetry Mosaic (?)
 - Single-Beam Surveys (?)
 - Single-Beam Sounding Density (?)
 - NOAA Hydrographic Surveys: (?)
 - All Surveys with Digital Data
 - Surveys with BAGs
 - BAG Shaded Relief Imagery (?)
- Search NCEI/DCDB Surveys (?)
- Crowdsourced Bathymetry Files (?)
- Search CSB Files (?)
- U.S. Bathymetry Coverage and Gap Analysis (?)
- EMODnet
- ▶ Australia
- ▶ Canada
- ▶ Cape Verde
- ▶ France
- ▶ Germany
- ▶ Japan
- ▶ Netherlands
- ▶ New Zealand
- ▶ Norway
- ▶ Portugal
- ▶ United Kingdom
- ▶ Other Data Sources
- ▶ Known Non-Public Data (?)
- ▶ Bathymetric Coverage Maps



Grid Extract
 More Information
 Help

Position: -78.708° -43.417°
 Elevation: 115.2 meters
 10km
 6mi

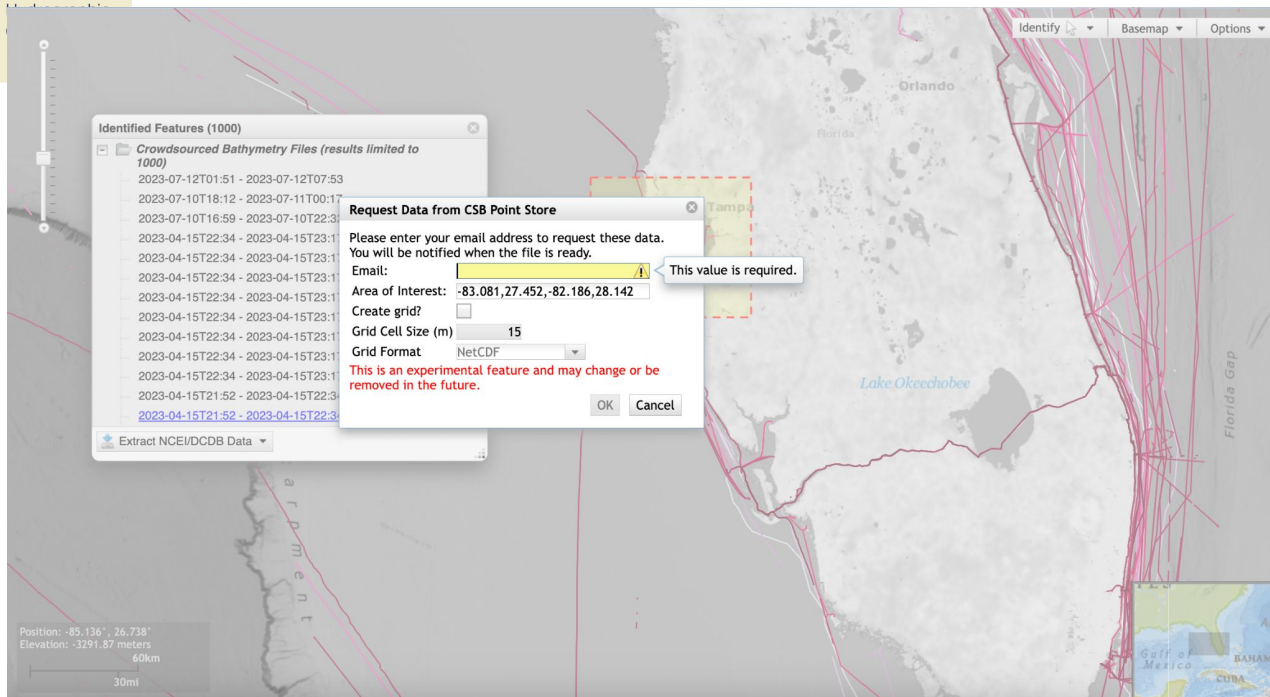




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Data Access - Point store

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- Created a cloud-hosted scalable point data store to better handle and store CSB data as a seamless collection of points.
- Data available in the cloud facilitates their use both for on-prem applications as well as cloud-native processing.
- **Includes an API** for programmatic query and extract from point store

https://github.com/CI-CMG/pointstore-api-docs/blob/main/pointstore_api.md



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S3 Bucket

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AWS S3 Explorer `noaa-dcdb-bathymetry-pds / .csb / csv` Hide folders? Folder Bucket Settings 8

Show entries Search:

Object	Last Modified	Timestamp	Size
2017/			
2018/			
2019/			
2020/			
2021/			
2022/			
2023/			
2024/			

Showing 1 to 8 of 8 entries Previous 1 Next

<https://noaa-dcdb-bathymetry-pds.s3.amazonaws.com/index.html#csb/csv/>



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Updated DCDB Webpage



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[Home](#) [Products](#) [Services](#) [Resources](#) [News](#) [Contact](#) [About](#)

Search NCEI

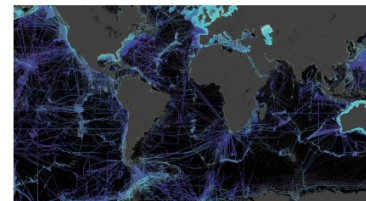


[Home](#) / [IHO Data Centre for Digital Bathymetry \(DCDB\)](#)

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](#)

[Multi/Singlebeam Bathymetry](#)

[Crowdsourced Bathymetry](#)

<https://www.ncei.noaa.gov/iho-data-centre-digital-bathymetry>



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Updated DCDB Webpage

Coastal waters remain unsurveyed. (Source: GEBCO)

About

Multi/Singlebeam Bathymetry

Crowdsourced Bathymetry

IHO Crowdsourced Bathymetry Initiative

The IHO defines crowdsourced bathymetry (CSB) as depth measurements collected and contributed by vessels, using standard navigation instruments, while engaged in routine maritime operations.

In 2014, the IHO recognized that traditional survey vessels alone could not be relied upon to solve data deficiency issues and agreed there was a need to encourage and support all mariners in an effort to “map the gaps.” An [initiative](#) was established to support and enable mariners and professionally manned vessels to collect CSB. This approach leverages underway x, y, z, t data already being collected on vessels with common commercial echo sounders and Global Navigation Satellite System receivers. CSB can be used to supplement the more rigorous and scientific bathymetric coverage done by hydrographic offices, industry, and researchers around the world.

Contribute CSB Data



Access CSB Data



IHO Guidance on Crowdsourced Bathymetry

The [IHO's Crowdsourced Bathymetry Working Group](#), comprised of international scientific, governmental and commercial hydrographic experts, was tasked by the IHO to develop a document that describes what constitutes CSB, the installation and use of data loggers, preferred data formats, and instructions for submitting data to the IHO DCDB.

The guidance document also provides information about data quality to help data collectors and data users better understand uncertainty and accuracy issues with crowdsourced bathymetry.

[B-12 Edition 3.0 IHO Guidance Document on Crowdsourced Bathymetry](#)



<https://www.ncei.noaa.gov/iho-data-centre-digital-bathymetry>



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CSB Coastal State Review Application

International

Home Manage Username: Chris Slater Log Out

Layer Chooser Show

Search Areas Search CSB Data

Search

Search Clear

ID	296
GEONAME	French Exclusive Economic Zone
TERRITORY1	France
ISO_TER1	FRA
SOVEREIGN1	France
TERRITORY2	
ISO_TER2	
SOVEREIGN2	
TERRITORY3	
ISO_TER3	
SOVEREIGN3	
ISO_SOV1	FRA
ISO_SOV2	
ISO_SOV3	
EXCLUDE	manual
DATA_SET	EEZ

Trace Id	Publish	External Id	Provider	Platform	Instrument	Start Time	End Time	File Name	File Size	Last Updated
000033e4-759c-4591-af98-04c29f6b967b	true Change	MACGR-9221566-AIDAAURA-oyHjp01	MacGregor	Anonymous		2020-03-28T03:08:33Z	2020-03-28T03:10:16Z	20220322085844674039_9221566-AIDAAURA-oyHjp01.tar.gz	965	2022-03-28T21:17:48.738516Z
000042ca-d435-4d84-ae4-ec04163d4dc2	true Change	MACGR-9221566-AIDAAURA-oyHjp01	MacGregor	Anonymous		2020-04-29T03:00:32Z	2020-04-29T03:02:36Z	20220322083434750180_9221566-AIDAAURA-oyHjp01.tar.gz	798	2022-03-28T15:16:03.354039Z

The DCDB has developed a **CSB Coastal State Review Application** to automate the approval process of data for coastal states who have provided positive responses but request pre-approval of data before the public distribution from DCDB.

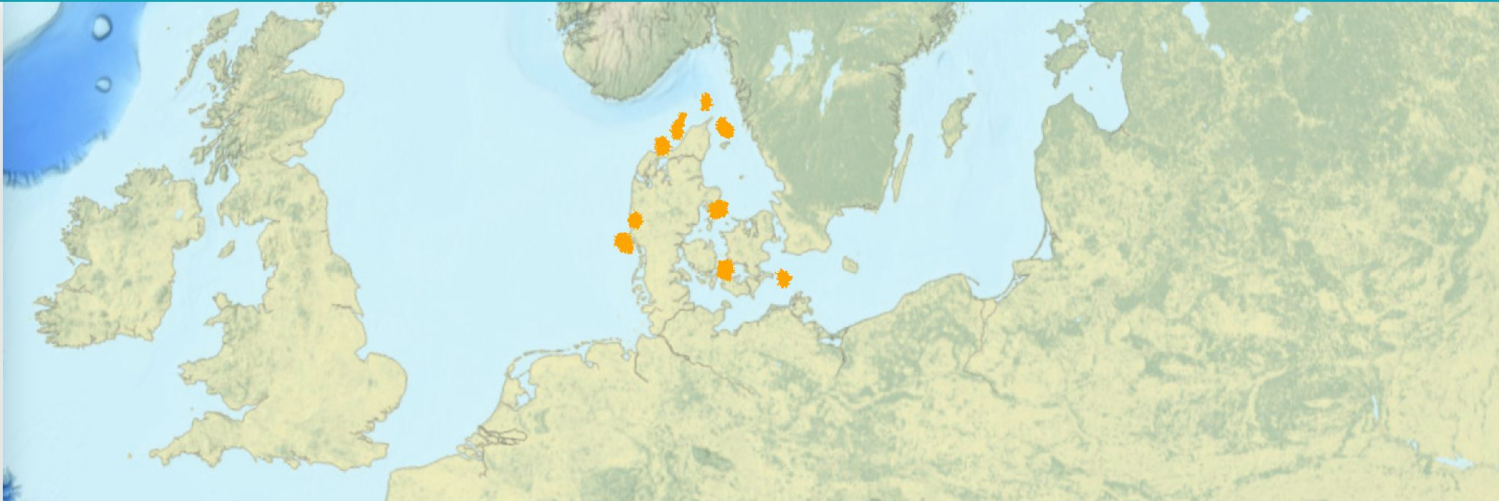
Many thanks to Denmark and France who tested the application last Fall.

Deployment of the application expected this Spring.



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CSB Data

File Name	Approval Status	Data License	Instrument	Start Time	End Time	File Size (B)	Last Updated	Created	Last Reviewed	Actions
20240116152320381054_dcba3a80-781f-43fd-9969-41368e7320e5.tar.gz	Not approved	CC0 1.0		2024-01-16T15:23:20Z	2024-01-16T15:23:20Z	34294	2024-01-16T15:28:54.990900Z	2024-01-16T15:28:54.861629Z		Search Download



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Home [Approve](#) [Access Tokens](#) [API Documentation](#) Username: **Edgar Earthquake** [Log Out](#)

CSB Data

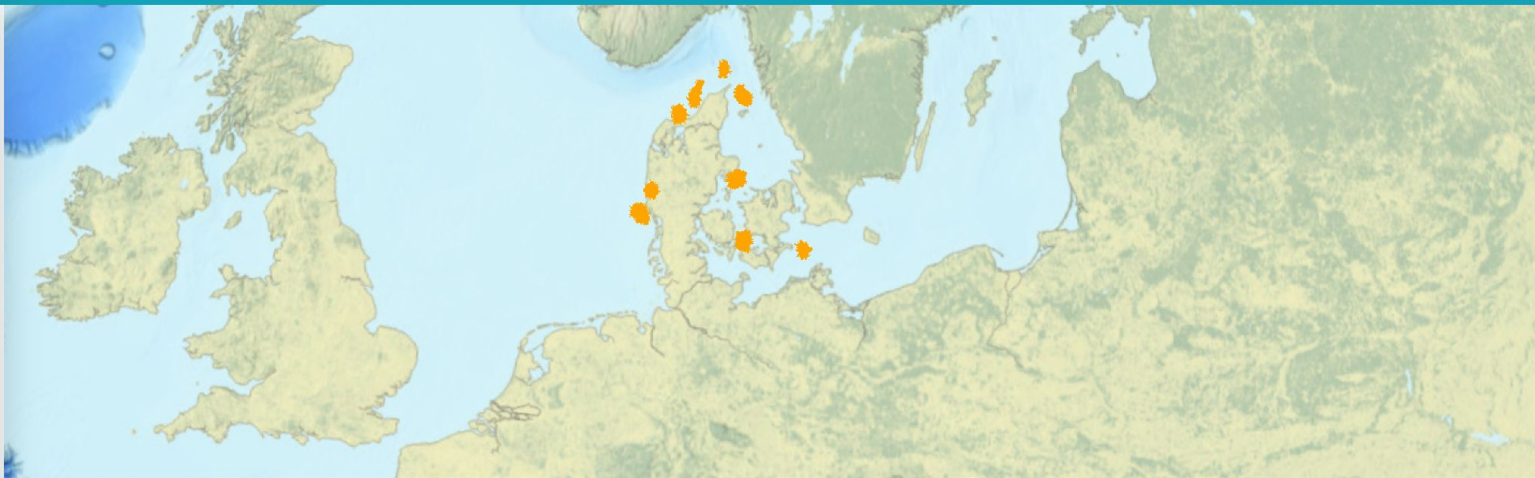
Approval	Data	File Size
----------	------	-----------

The screenshot shows a web interface for the International Hydrographic Organization (IHO). At the top, there are navigation links: Home, Approve, Access Tokens, and API Documentation. On the right, the user is identified as 'Edgar Earthquake' with a 'Log Out' button. The main area is a map of Europe with a red rectangular search area overlaid on the North Sea region. Several yellow star-shaped markers are scattered across the map, primarily in the North Sea and around the British Isles. Below the map is a toolbar with the following options: Refresh, Search, Sort, Clear Search Area, Confirm Search Area (highlighted with a red box), Export Table, and Download All Files. On the far right of the toolbar is a 'Batch Approve' button. Below the toolbar, the text 'CSB Data' is visible. At the bottom of the page, there is a table header with columns for 'Approval', 'Data', and 'File Size', each with a small double-headed arrow icon next to it.



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CSB Data

File Name	Approval Status	Data License	Instrument	Start Time	End Time	File Size (B)	Last Updated	Created	Last Reviewed	Actions
20240116152320381054_dcba3a80-781f-43fd-9969-41368e7320e5.tar.gz	Not approved	CC0 1.0		2024-01-16T15:23:20Z	2024-01-16T15:23:20Z	34294	2024-01-16T15:28:54.990900Z	2024-01-16T15:28:54.861629Z		🔍 ↓
20240116152306335176_dcba3a80-781f-	Not	CC0 1.0		2024-01-	2024-01-	25612	2024-01-	2024-01-		🔍



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Home Approve Access Tokens API Documentation Username: **Edgar Earthquake** Log Out

Approval

Area Type	Approval Status	Last Updated By
Twelve Nautical Miles	Not approved	
Land and Internal Waters	Not approved	

Refresh Search Sort Draw Search Area Export Table Download All Files Batch Approve

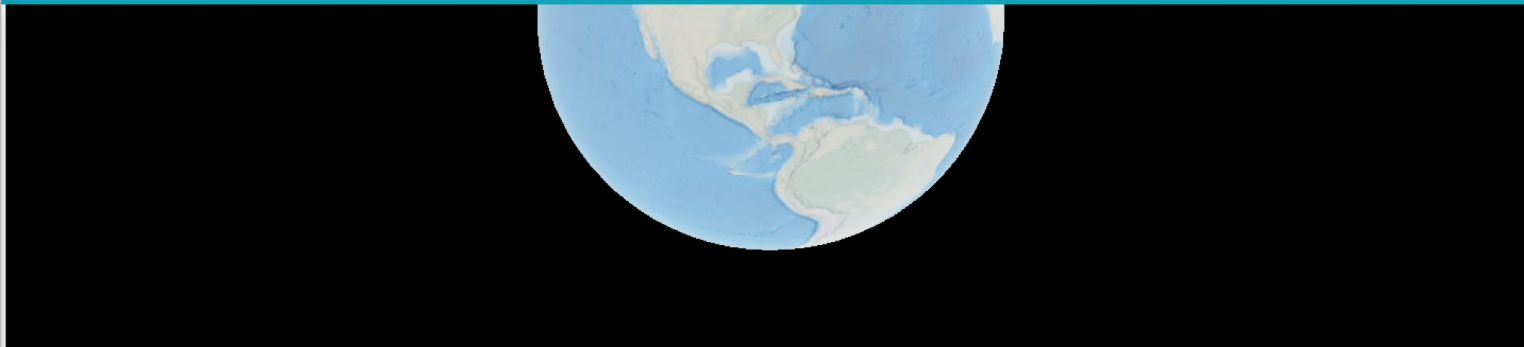
CSB Data

File Name	Approval Status	Data License	Instrument	Start Time	End Time	File Size (B)	Last Updated	Created	Last Reviewed	Actions
20240116152320381054_dcba3a80-781f-43fd-9969-41368e7320e5.tar.gz	Not approved	CC0 1.0		2024-01-16T15:23:20Z	2024-01-16T15:23:20Z	34294	2024-01-16T15:28:54.990900Z	2024-01-16T15:28:54.861629Z		
20240116152306335176_dcba3a80-781f-	Not	CC0 1.0		2024-01-	2024-01-	25612	2024-01-	2024-01-		



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Approve Selected Unapprove Selected [View All 2](#) [Cancel](#)

CSB Data

File Name	Approval Status	Data License	Instrument	Start Time	End Time	File Size (B)	Last Updated	Created	Last Reviewed	Actions
20240116152320381054_dcba3a80-781f-43fd-9969-41368e7320e5.tar.gz	Not approved	CC 0.10		2024-01-16T15:23:20Z	2024-01-16T15:23:20Z	34294	2024-01-16T15:28:54.990900Z	2024-01-16T15:28:54.861629Z	2024-01-16T17:19:31.775208Z	🔍 ↓
20240116152311832237_dcba3a80-781f-43fd-9969-41368e7320e5.tar.gz	Not approved	CC 0.10		2024-01-16T15:23:11Z	2024-01-16T15:23:11Z	4868	2024-01-16T15:27:58.783288Z	2024-01-16T15:27:58.737514Z		🔍 ↓



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Updated gridded data viewer (“Autogrid”)

The existing Autogrid web application accepts a user’s area of interest, cell size, and grid format and asynchronously produces a custom data grid from the multibeam archive.

The updated application, currently under development, **integrates multibeam and CSB.**

New filter criteria and output formats will be supported. GEBCO and ETOPO will be added as additional background fill options.



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Next Generation Map Viewer

The screenshot shows the 'Trackline Geophysical Data Viewer' interface. On the left, there is a 'Filter Cruises' panel with the following options: Survey Type (All Survey Types), Min Year (1939), Max Year (2024), Platform Names, Institution Names, Survey IDs, and Date added to database (Start and End). Below the filters are 'ZOOM TO RESULTS' and 'RESET FILTER' buttons. The main map area displays a dense network of red tracklines overlaid on a bathymetric chart of the Atlantic and Pacific Oceans. The map includes labels for various ocean basins (e.g., Hudson Bay, Labrador Basin, North American Basin, South Atlantic Ocean) and geographical features. The footer contains the text: 'General Bathymetric Chart of the Oceans (GEBCO). NOAA National Centers for Environmental Information (NCEI) | NOAA National Centers for Environmental Information (NCEI) | Powered by Esri | Privacy Policy | Freedom Of Information Act | Information Quality | Disclaimer | Take Our Survey | Department of Commerce | NOAA | NESDIS | Contact Us'.

Motivations to modernize map viewers:

- Maintainability
- Ability to update to latest ArcGIS API for JavaScript 4.x
- Use of well-supported libraries
- Modern UI design
- Accessibility - 508 compliance



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CSBWG feedback to be reviewed summer 2024

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- Searchable interface for S3 bucket, building towards access of cloud-hosted files corresponding to a particular location.
- Improve approach to translation of files between ArcGIS MapService API and S3 bucket.
- Ensure full metadata is accessible alongside CSV in cloud buckets.
- Ongoing enhancements to approval app, building upon feedback from Denmark and France during testing.
- Ensure pipeline is compatible with GeoJSON schema updates.

We welcome and encourage continued feedback! Our enhancements are based on user requirements.




Thank you.

georgianna.zelenak@noaa.gov



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Gridded Data Viewer

[MORE INFORMATION](#)

[NCEI Home](#) > [Maps and Geospatial Products](#) > [Passive Acoustic Data](#)

AutoGrid

Data Types to Include

2 Enter Filter Criteria

[RESET FILTER](#)

Date of Data Collection:

Start Date End Date

Date added to database:

Start Date End Date

Platform Names

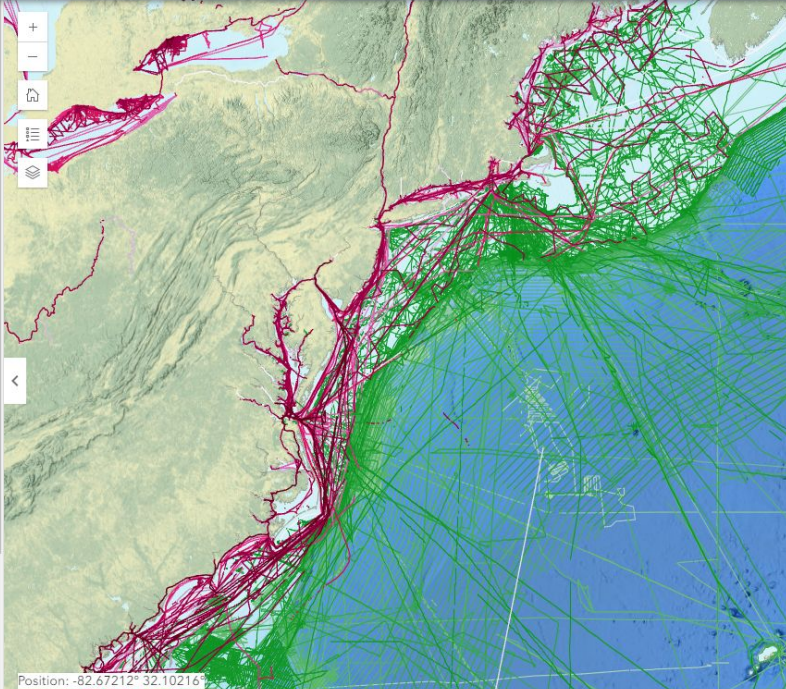
Data Providers

Multibeam Processing Level
Raw and processed data

Multibeam Survey IDs

Include these Surveys
 Exclude these Surveys

[CONTINUE](#) [BACK](#)



Position: -82.67212° 32.10216°

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS | General Bathymetric Chart of the Oceans (GEBCO) | NOAA National Centre... Powered by Esri



IHO

DCDB Enhancements

Development of a “CSB Pointstore Dashboard”

Internat
Hydrogra
Organiza

Report Date: 2023-05-14

Total Count: 905,966,250

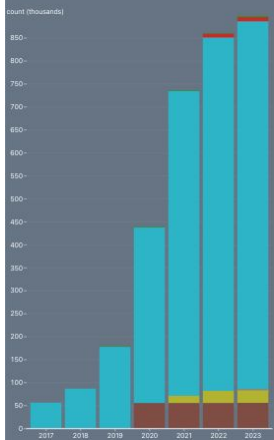
Archive Dates:
2017-04-25 to 2023-05-13

6 orders in the last 30 days

Providers

Rosepoint	806,901,847 (89%)
MacGregor	55,344,300 (6%)
PGS	28,342,506 (3%)
GLOS	9,020,058 (1%)
AquaMap	2,985,809 (<1%)
FarSounder	2,778,223 (<1%)
Orange Force Marine	303,896 (<1%)
Anonymous	146,633 (<1%)

Archive Growth



HEADER

