



# IHO Data Center for Digital Bathymetry

## *An update*

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International  
Hydrographic  
Organization

9<sup>th</sup> - 12<sup>th</sup> January 2022  
Boulder, Colorado USA

IHO CSB Working Group 13



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# Today's Talk

International  
Hydrographic  
Organization

## CSB Data Pipeline & Data Statistics

## Ongoing & Planned Enhancements





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Today's Talk

International  
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## CSB Data Pipeline & Data Statistics



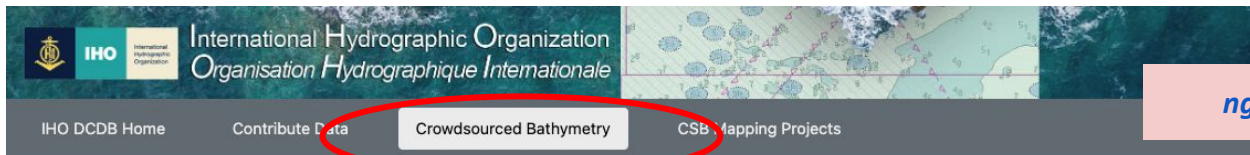




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# IHO Data Centre for Digital Bathymetry (DCDB)

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[ngdc.noaa.gov/iho/](https://ngdc.noaa.gov/iho/)

## 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. CSB can be used to supplement the more rigorous and scientific bathymetric coverage done by hydrographic offices, industry, and researchers around the world.

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.

### Contributing CSB Data to the DCDB

The DCDB accepts CSB contributions through a network of "Trusted Nodes," which may be 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. The IHO DCDB intends to publicly release the Trusted Node's data in its original form under the [CC0](#) public domain dedication via the [IHO DCDB Viewer](#).

The following documents clarify some aspects on CSB related to the submission of data to IHO DCDB:

- [IHO CSB Trusted Node Agreement Form Template](#)
- [Guidance for Submitting CSB Data to the IHO DCDB](#)
- [Sample CSB File Formats](#)

Those interested in contributing data or becoming a Trusted Node should contact the DCDB at [bathydata@iho.int](mailto:bathydata@iho.int).



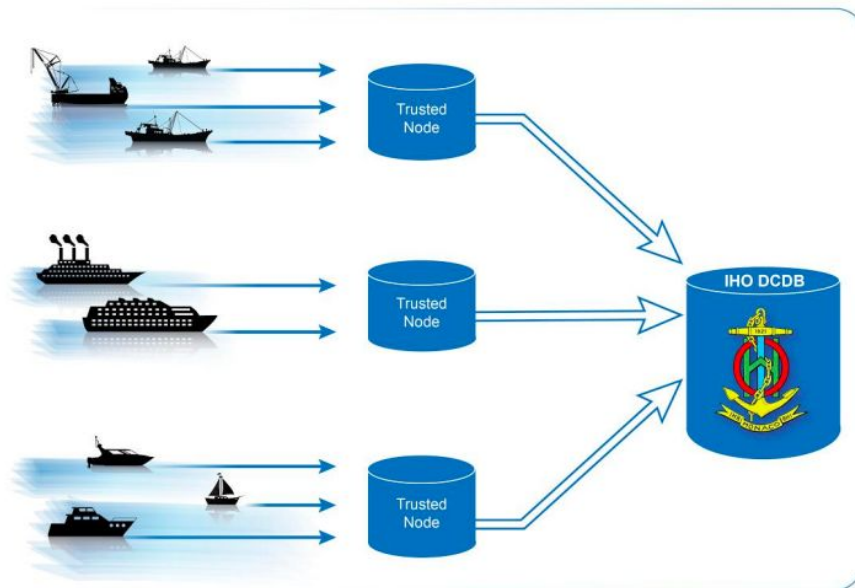


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## CSB Data Flow (Ideal Scenario)

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





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# The IHO Crowdsourced Bathymetry Initiative

## CSB Data Pipeline

LON, LAT, DEPTH, TIME

```

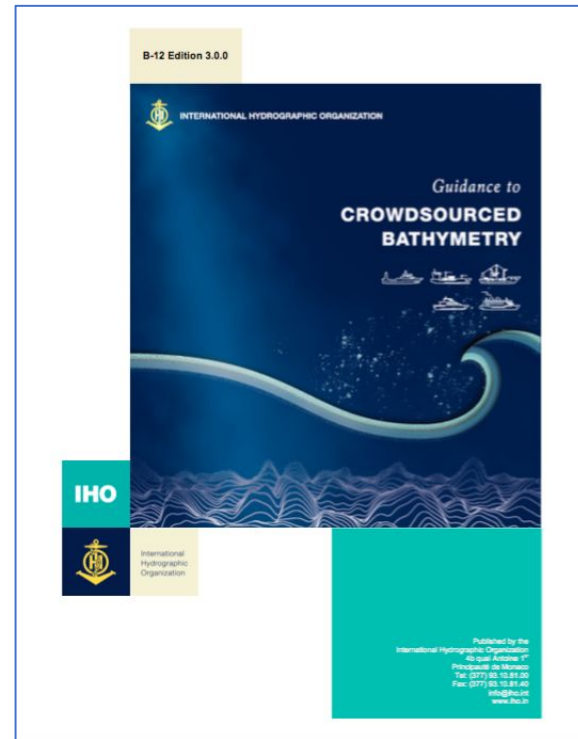
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68.498655, 15.833184, 61.3, 2020-02-25T01:08:15Z
68.498592, 15.833239, 61.3, 2020-02-25T01:08:16Z
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68.49815, 15.833622, 55.3, 2020-02-25T01:08:24Z
68.49815, 15.833622, 55.3, 2020-02-25T01:08:24Z
68.497713, 15.83401, 54.3, 2020-02-25T01:08:30Z
68.497399, 15.834287, 53.3, 2020-02-25T01:08:35Z
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68.497084, 15.83456, 59.3, 2020-02-25T01:08:40Z
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68.496708, 15.83489, 54.3, 2020-02-25T01:08:47Z
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68.496457, 15.835112, 49.3, 2020-02-25T01:08:50Z
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```

```

{
  "crs": {
    "horizontal": {
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    },
    "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": {
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    "correctors": {
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    }
  }
}

```



[iho.int/uploads/user/pubs/bathy/B\\_12\\_CSB-Guidance\\_Document-Edition\\_3.0.0\\_Final.pdf](https://iho.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf)



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# The IHO Crowdsourced Bathymetry Initiative

## CSB Data Pipeline

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**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
- France
- Germany
- Japan
- Netherlands
- New Zealand
- Portugal
- United Kingdom
- Other Data Sources
- Known Non-Public Data ?
- Bathymetric Coverage Maps

Grid Extract  
More Information  
Help

**Data Centre for Digital Bathymetry Viewer**

Identify ▼ Basemap ▼ Options ▼

Mercator  
Arctic  
Antarctic

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

Position: -146.953°, 52.286°  
Elevation: -3527 meters





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# CSB Data Holdings ~2019

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## National positions on CSB

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- IHO Member States were requested to indicate their position on the **provision of CSB data** collected within waters subject to their national jurisdiction into the public domain
- To date, 32 coastal States (**green**) have replied positively\*



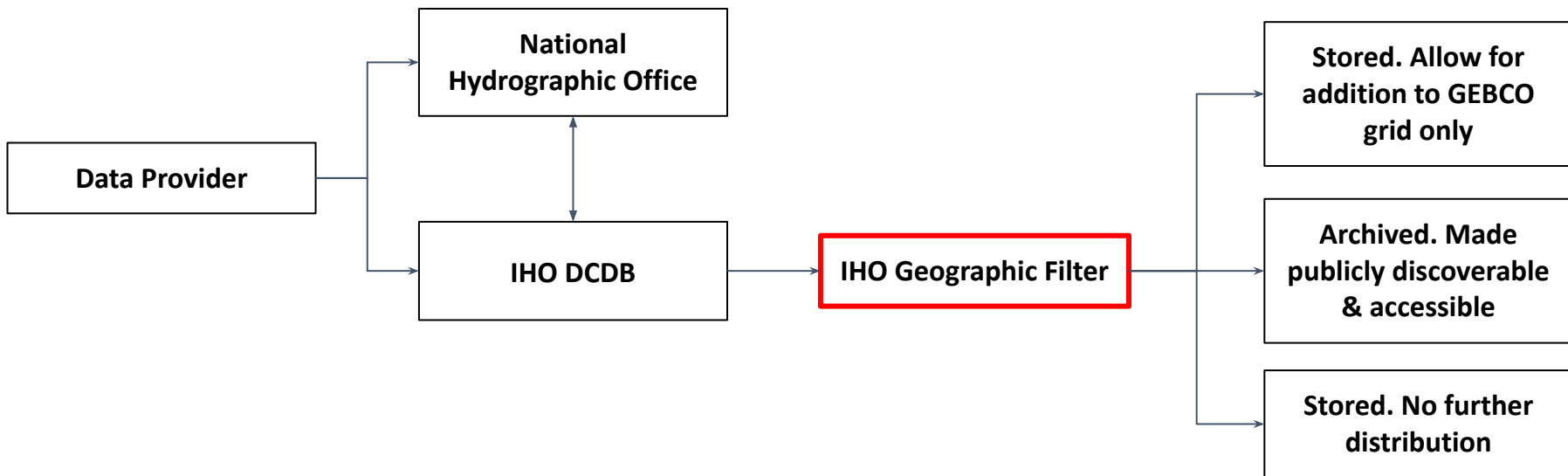


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# Geographic Filter

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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.

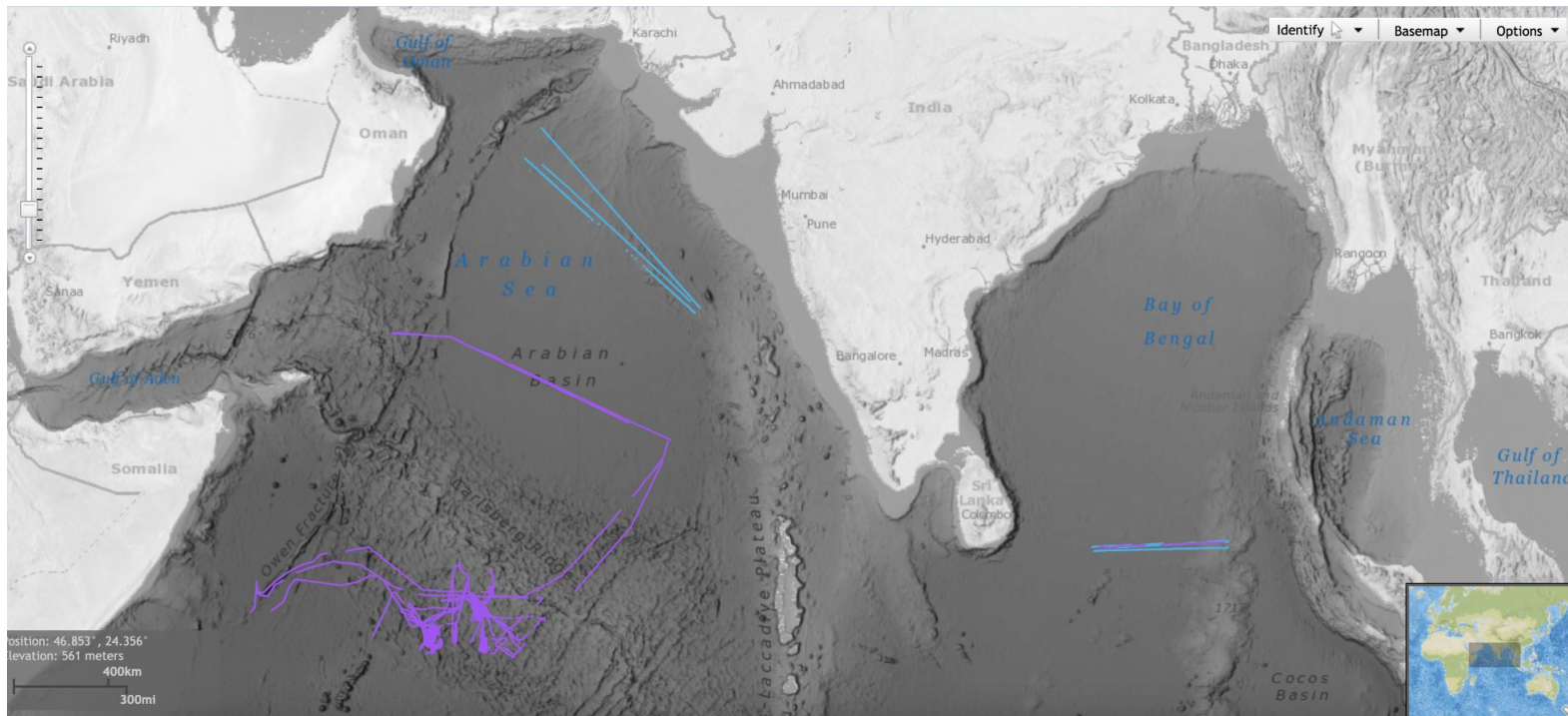




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# Geographic Filter

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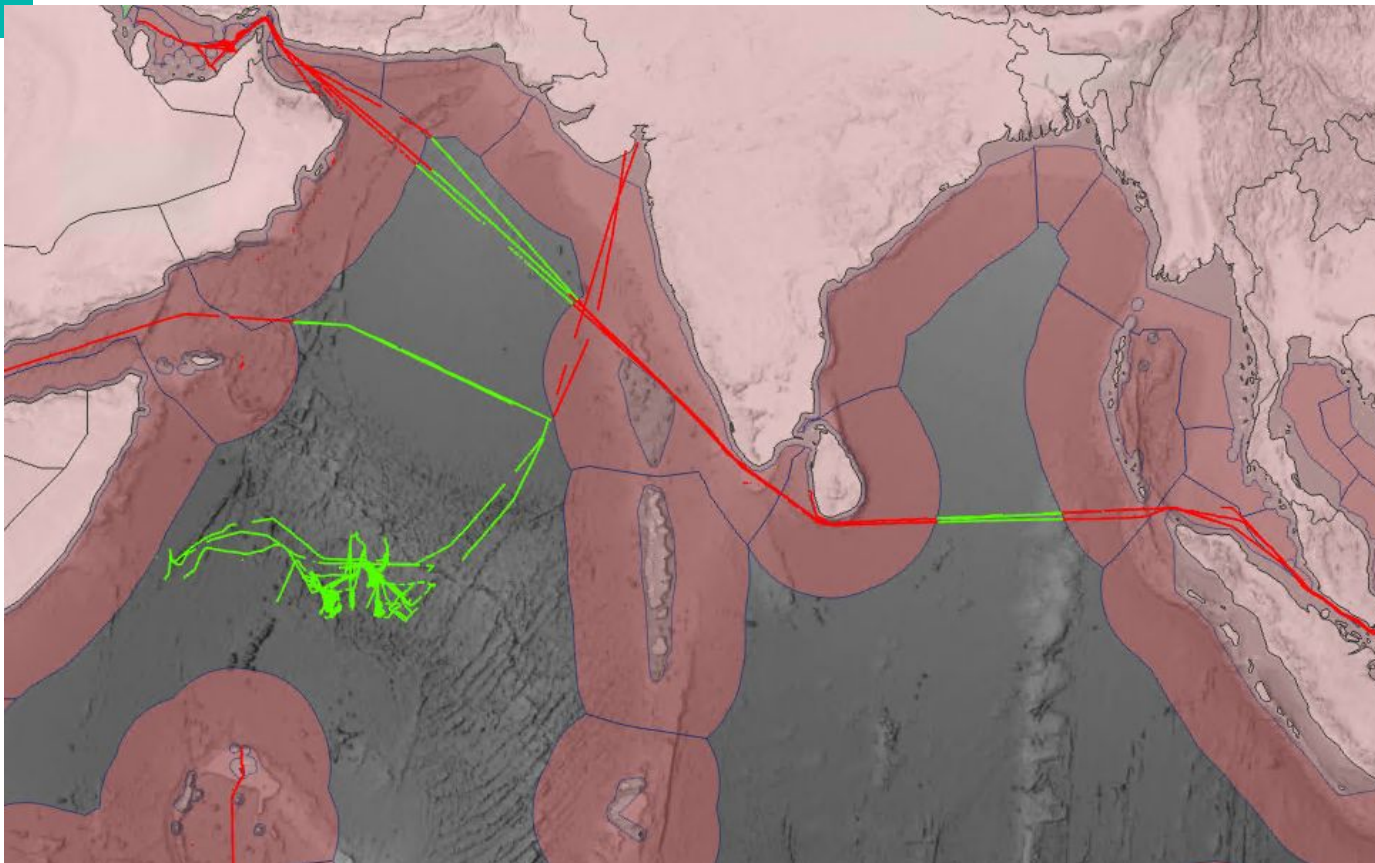




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# Geographic Filter

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

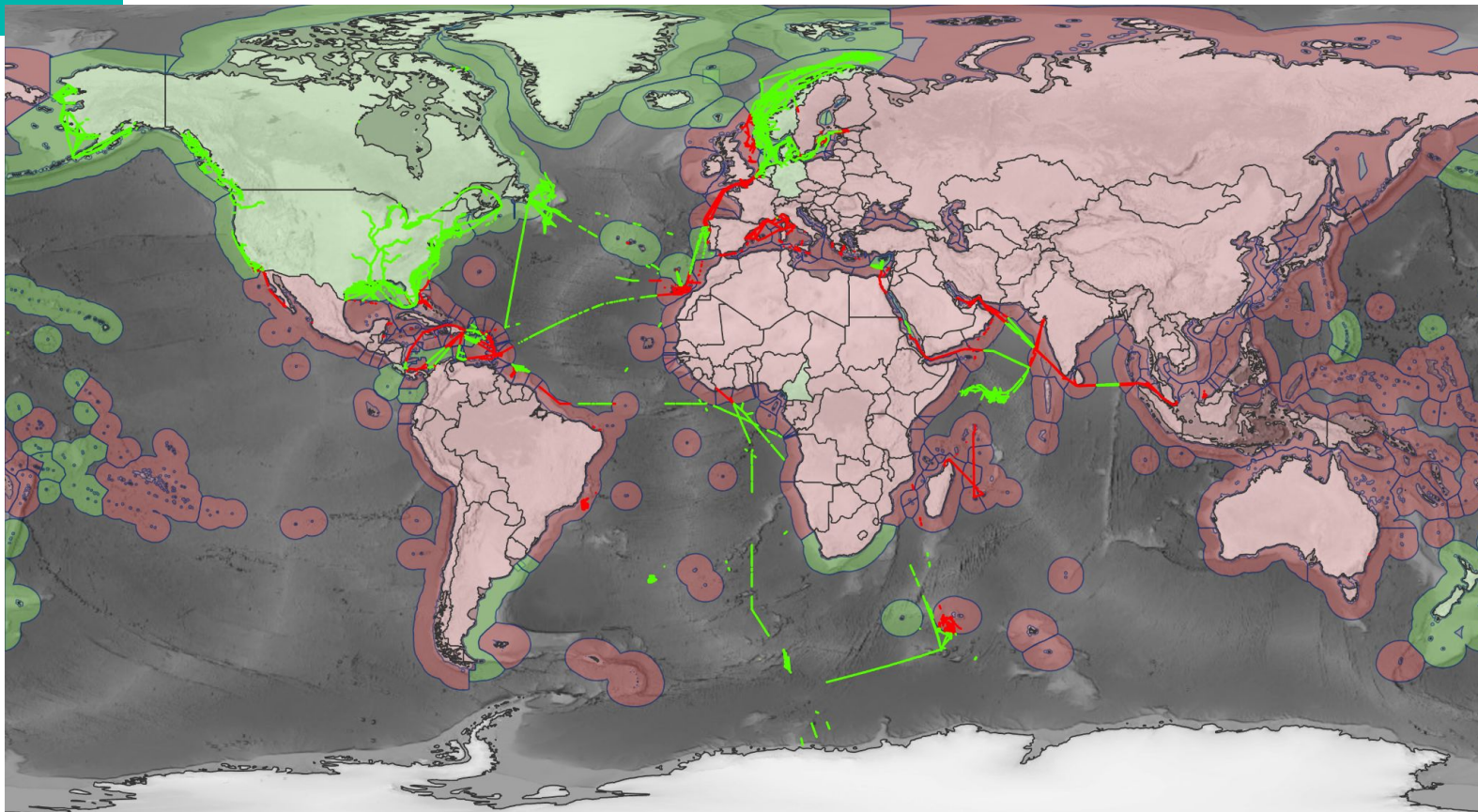




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# Geographic Filter

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

3.2 GB filtered globally

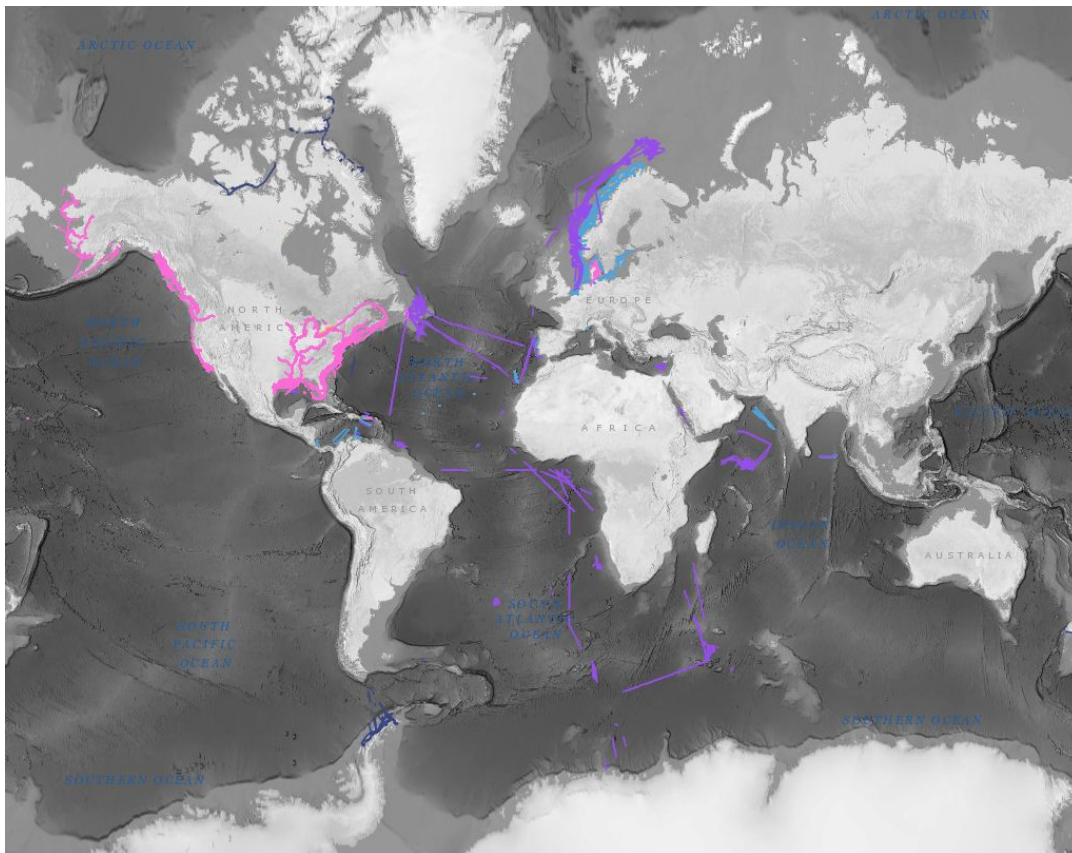


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# CSB Data Holdings - Statistics

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- 25GB+ from 7 trusted nodes currently publicly accessible
  - 85%+ from Rose Point
  - 257 vessels total, including 'Anonymous'
  - 234 vessels associated with Rose Point
- Additional 3GB filtered based on responses to IHO C/L

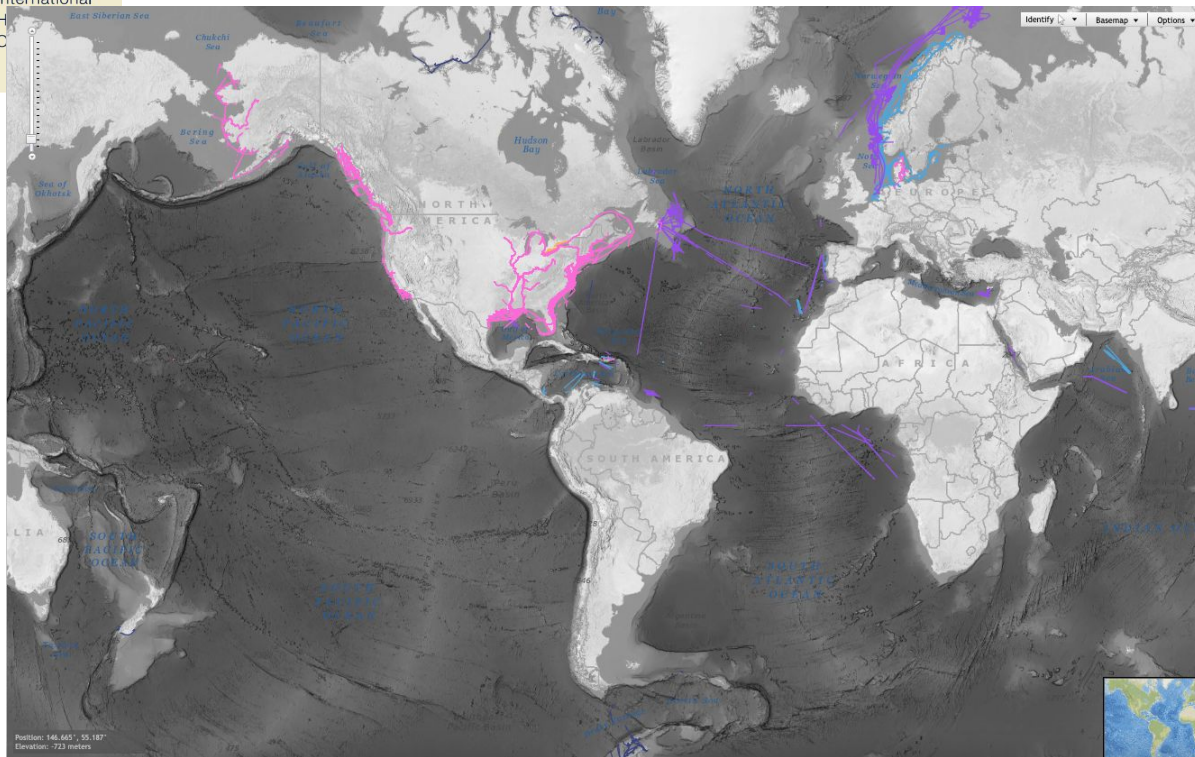




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# Current Trusted Nodes

International  
H  
C



- Current Trusted Nodes:
  - Rosepoint Navigation Systems
  - FarSounder Inc.
  - MacGregor Germany/Carnival Cruise Line
  - Petroleum Geo-Services (PGS)
  - M2Ocean
  - Great Lakes Observing System (GLOS)
  - Orange Force Marine (OFM)
  - Navico C-MAP
- In Process:
  - James Cook University
  - Seabed 2030
  - CIDCO
  - Aquamap





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# Today's Talk

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## Ongoing & Planned Enhancements







- Token generation for new TNs takes minutes
- Geographic filter can be easily updated as new responses to the C/L are received, with changes showing up on the viewer within days
- Resubmission of files during pipeline rollout resolved many previous errors

The screenshot displays the IHO web application interface. At the top, there is a navigation bar with "Home" and "Manage" links, and a user profile section for "Georgie" with a "Log Out" button. The main content area is divided into two panels. The left panel contains a "Tile Actions" section with "Clear Tile Status Cache" and "Regenerate Tiles" buttons. Below this is an "Import Shapefile" section with a text input field and a "Browse" button. Further down is a "Search Areas" section with a "Search CSB Data" button, a "Name:" field with an "Enter Name" input, an "Excluded:" dropdown menu, and "Search" and "Clear" buttons. The right panel shows a globe with various colored overlays representing geographic data. Below the globe is a table with columns for "Id", "Type", "Name", "Sovereign", "Territory", and "Exclude". The table is currently empty, and there is a "Changes" section below it.



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# 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.

Home Manage Username: Chris Slater Log Out

Search Areas [Search CSB Data](#)

Search

----

[Search](#) [Clear](#)

Layer Chooser Show

French Exclusive Economic Zone	
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 <a href="#">Change</a>	MACGR-9221566-AIDAAURA-oyHjp011	MacGregor	Anonymous		2020-03-28T03:08:32Z	2020-03-28T03:10:16Z	20220322085844674039_9221566-AIDAAURA-oyHjp011.tar.gz	965	2022-03-28T21:17:48.738516Z
000042ca-d435-4d84-ae4-ec04163d4dc2	true <a href="#">Change</a>	MACGR-9221566-AIDAAURA-oyHjp011	MacGregor	Anonymous		2020-04-29T03:00:32Z	2020-04-29T03:02:36Z	20220322083434750180_9221566-AIDAAURA-oyHjp011.tar.gz	798	2022-03-28T15:16:03.354039Z



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# Improving Data Access

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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

Search NCEI/DCDB Surveys

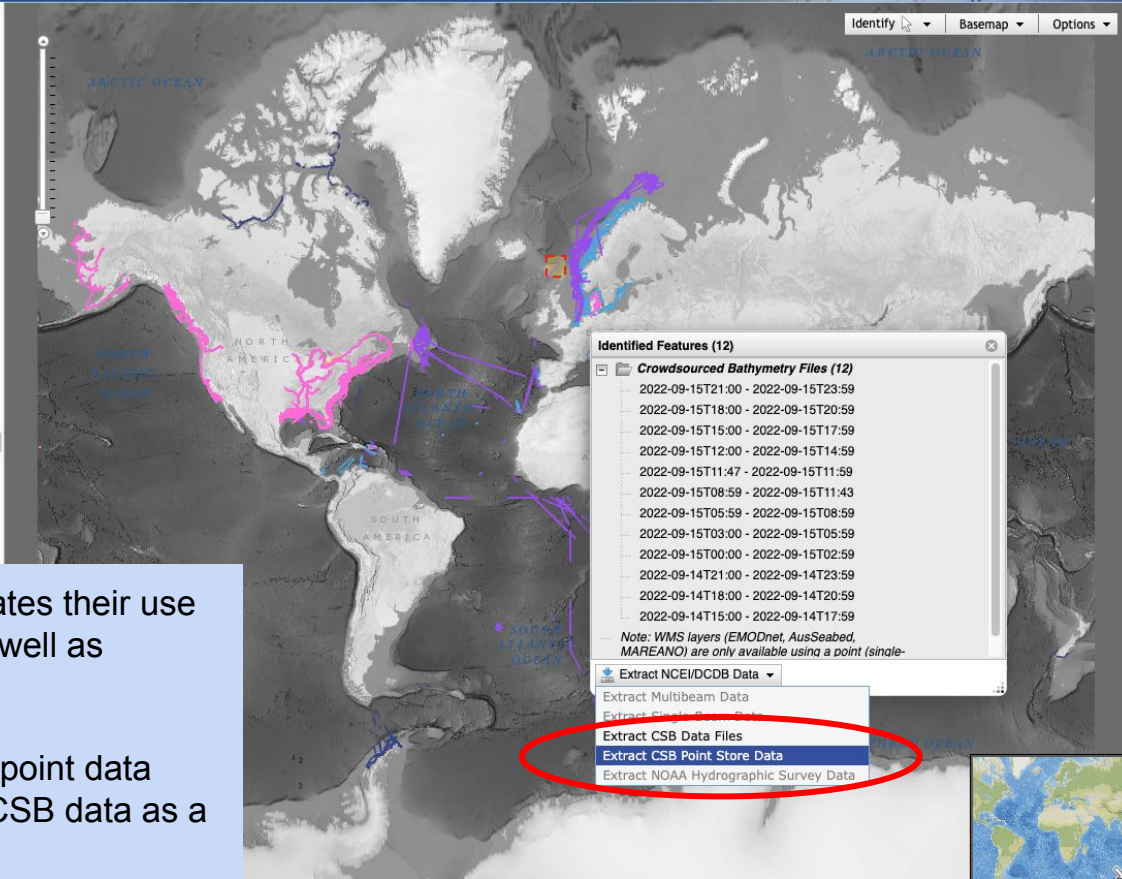
Crowdsourced Bathymetry Files

Search CSB Files

U.S. Bathymetry Coverage and Gap Analysis

EMODnet

- Australia
- Canada
- France
- Germany
- Japan
- Netherlands



Mercator  
Arctic  
Antarctic

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



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# Improving Data Access



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## Data Centre for Digital Bathymetry Viewer

International  
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Organization

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
- France
- Germany
- Japan
- Netherlands

Identify Basemap Options

Mercator Arctic Antarctic

Request Data from CSB Point Store

Please enter your email address to request these data. You will be notified when the file is ready.

Email:

Area of Interest:

Create grid?

Grid Cell Size (m)

Grid Format

This is an experimental feature and may change or be removed in the future.

Identified Features (12)

- Crowdsourced Bathymetry Files (12)
- 2022-09-15T21:00 - 2022-09-15T23:59
- 2022-09-15T18:00 - 2022-09-15T20:59
- 2022-09-15T15:00 - 2022-09-15T17:59
- 2022-09-15T12:00 - 2022-09-15T14:59
- 2022-09-15T11:47 - 2022-09-15T11:59
- 2022-09-15T08:59 - 2022-09-15T11:43
- 2022-09-15T05:59 - 2022-09-15T08:59
- 2022-09-15T03:00 - 2022-09-15T05:59
- 2022-09-15T00:00 - 2022-09-15T02:59
- 2022-09-14T21:00 - 2022-09-14T23:59
- 2022-09-14T18:00 - 2022-09-14T20:59
- 2022-09-14T15:00 - 2022-09-14T17:59

Note: WMS layers (EMODnet, AusSeabed, MAREANO) are only available using a point (single-)

Position: 38.320°, -54.961°  
Elevation: -3561 meters

1. Generate bathymetric grids of a given area using user-specified resolution (CSB only)





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# Improving Data Access, AND Data Usefulness

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The screenshot displays the NOAA AutoGrid web interface. The header includes the NOAA logo and the text "NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION" and "NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION". The breadcrumb trail reads "NOAA > NESDIS > NCEI > Maps > Multibeam Bathymetry". The main content area is split into a left sidebar and a right map area. The sidebar contains an "Email: (required)" form with a "Submit Request" button and a "Privacy Act Statement" link. Below this is an "About AutoGrid" section with a description of the program and a list of grid types: NetCDF binary grid, ESRI ASCII Raster grid, and XYZ (lon/lat/depth) grid. It also lists map image formats (postscript, pdf, jpg, png, gif) and provides instructions on how to create a new map, including a list of required parameters: email address, area of interest, and request parameters. The map area shows a bathymetric grid of the North Atlantic Ocean, with depth contours and a green grid overlay. The map includes labels for "East Siberian Sea", "Chukchi Sea", "Hudson Bay", "Labrador Basin", "NORTH AMERICA", "NORTH ATLANTIC OCEAN", "SOUTH AMERICA", and "Peru Basin". The map is titled "AutoGrid" in the top right corner. The map area also includes an "Area of Interest" dropdown menu, "Basemap" and "Options" dropdown menus, and a "Privacy Policy" link. The map is displayed in Mercator projection, with a vertical scale bar on the left and a small inset map in the bottom right corner.

1. Generate bathymetric grids of a given area using user-specified resolution (**CSB & MB**)

2. Show data density, guiding future data collection efforts

3. Query the data collection, providing statistics on bathymetric measurements

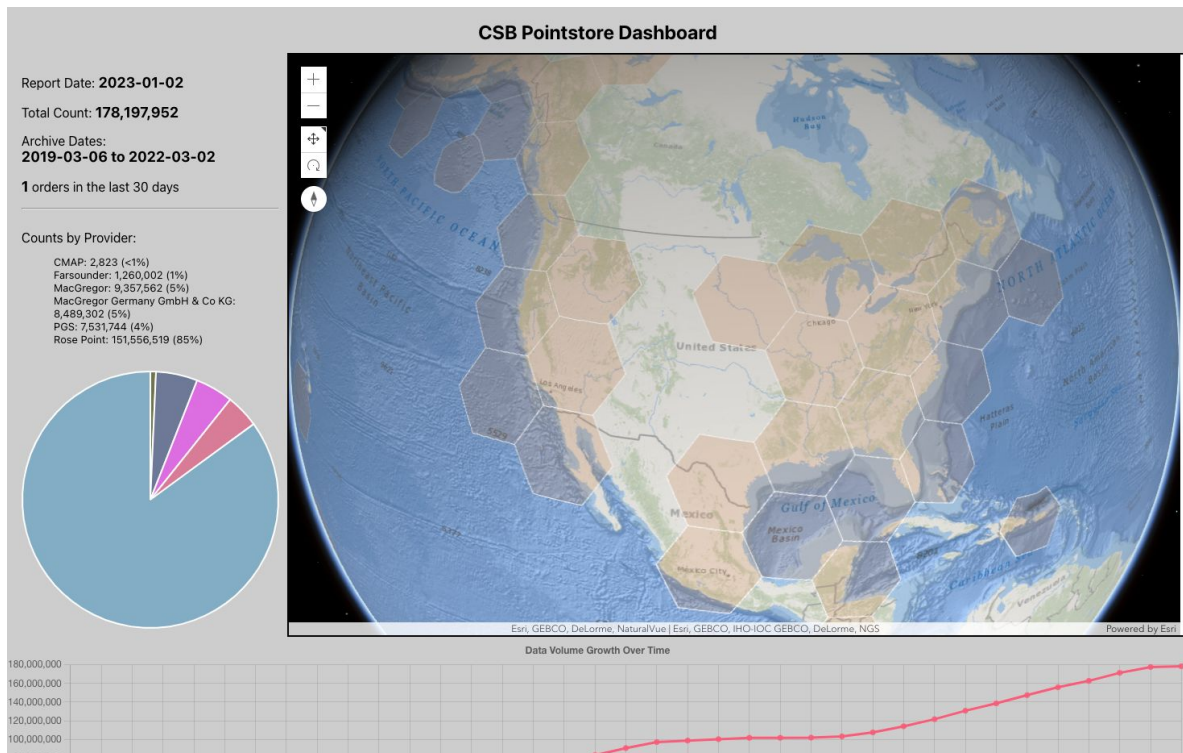


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# Improving Data Visualization

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- Currently experimenting with various ways to display point data
- Pilot “CSB Pointstore Dashboard” intended for internal data management use
- Intent is for aspects of the visualization functionality to be made publicly accessible in the future.







Thank you.

[georgianna.zelenak@noaa.gov](mailto:georgianna.zelenak@noaa.gov)