

# IRCC14-07J

## IHO Data Centre for Digital Bathymetry

Report to IRCC14

Denpasar - Bali, Indonesia + VTC (Hybrid Meeting)

6 – 8 June 2022

By Jennifer Jencks  
Director, IHO DCDB



**IHO**

International  
Hydrographic  
Organization

IRCC14  
Denpasar - Bali, Indonesia + VTC (Hybrid Meeting), 06 – 08 June 2022

**IRCC14-07J**

## 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.



*IHO DCDB Data Viewer highlighting ship tracks and data availability over the Pacific Ocean and neighboring regions*

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](#)



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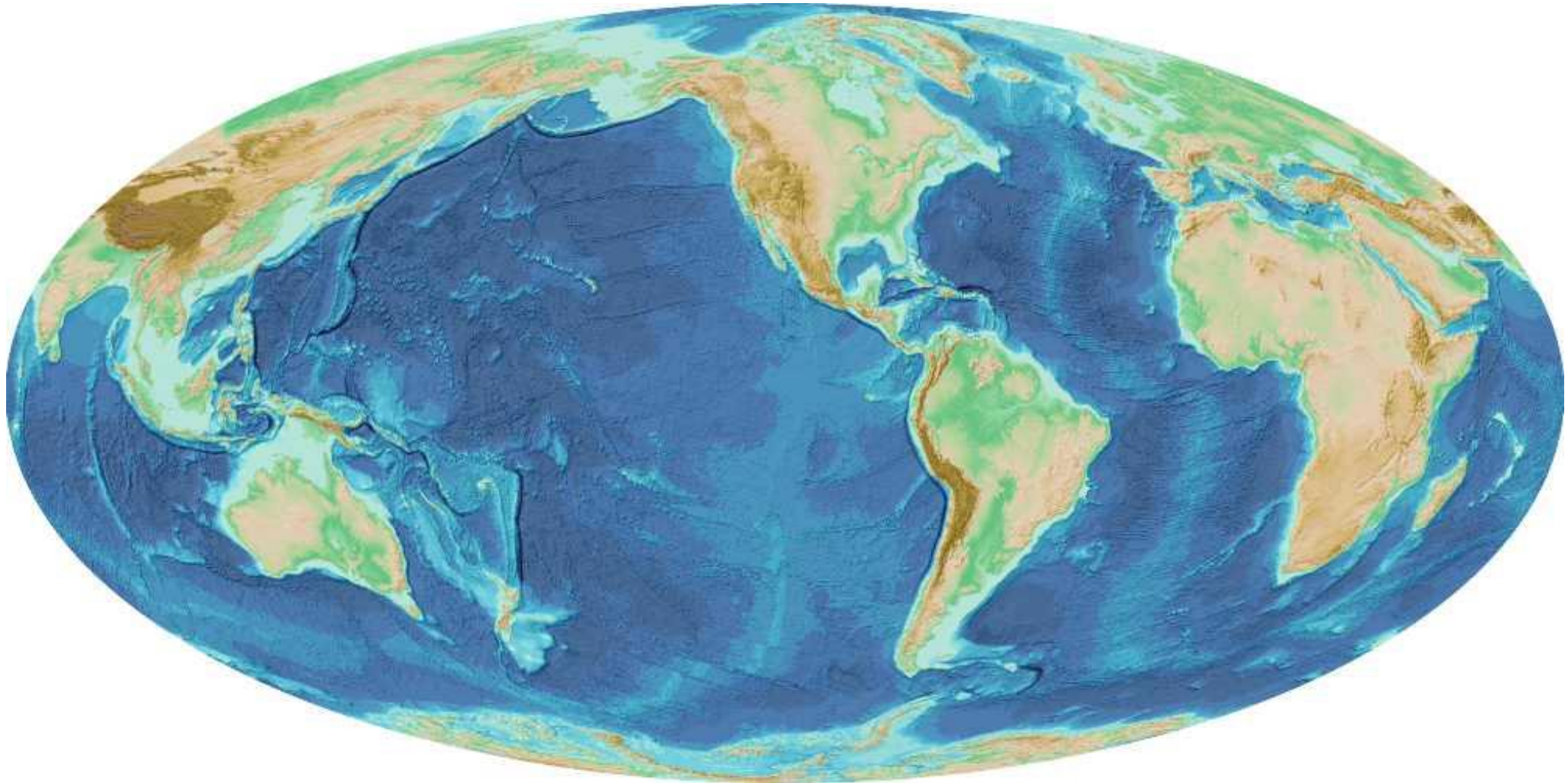
[ngdc.noaa.gov/iho/](https://ngdc.noaa.gov/iho/)



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**DCDB Data Holdings** ⇒ **GEBCO Products**

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GEBCO 2021 grid = 20.6% of seafloor mapped



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# DCDB Data Holdings

The estimated global seafloor coverage held in the DCDB multibeam archive is calculated to be ~12%

International Hydrographic



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International Hydrographic Organization

## 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 X Reset ?

Crowdsourced Bathymetry Files ?

Search CSB Files X Reset ?

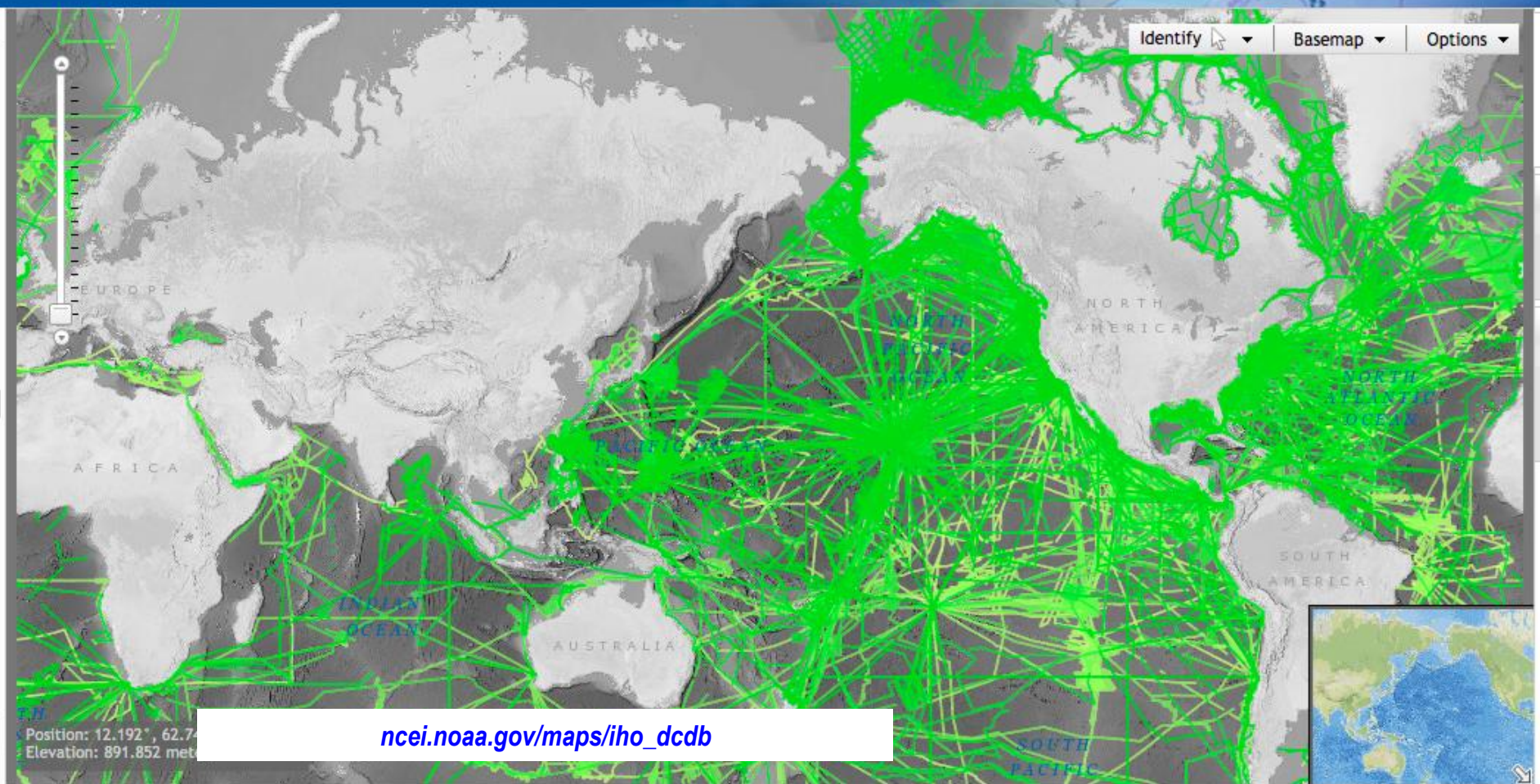
U.S. Bathymetry Coverage and Gap Analysis ?

EMODnet

- ▶ Australia
- ▶ Canada
- ▶ France

More Information

Help



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

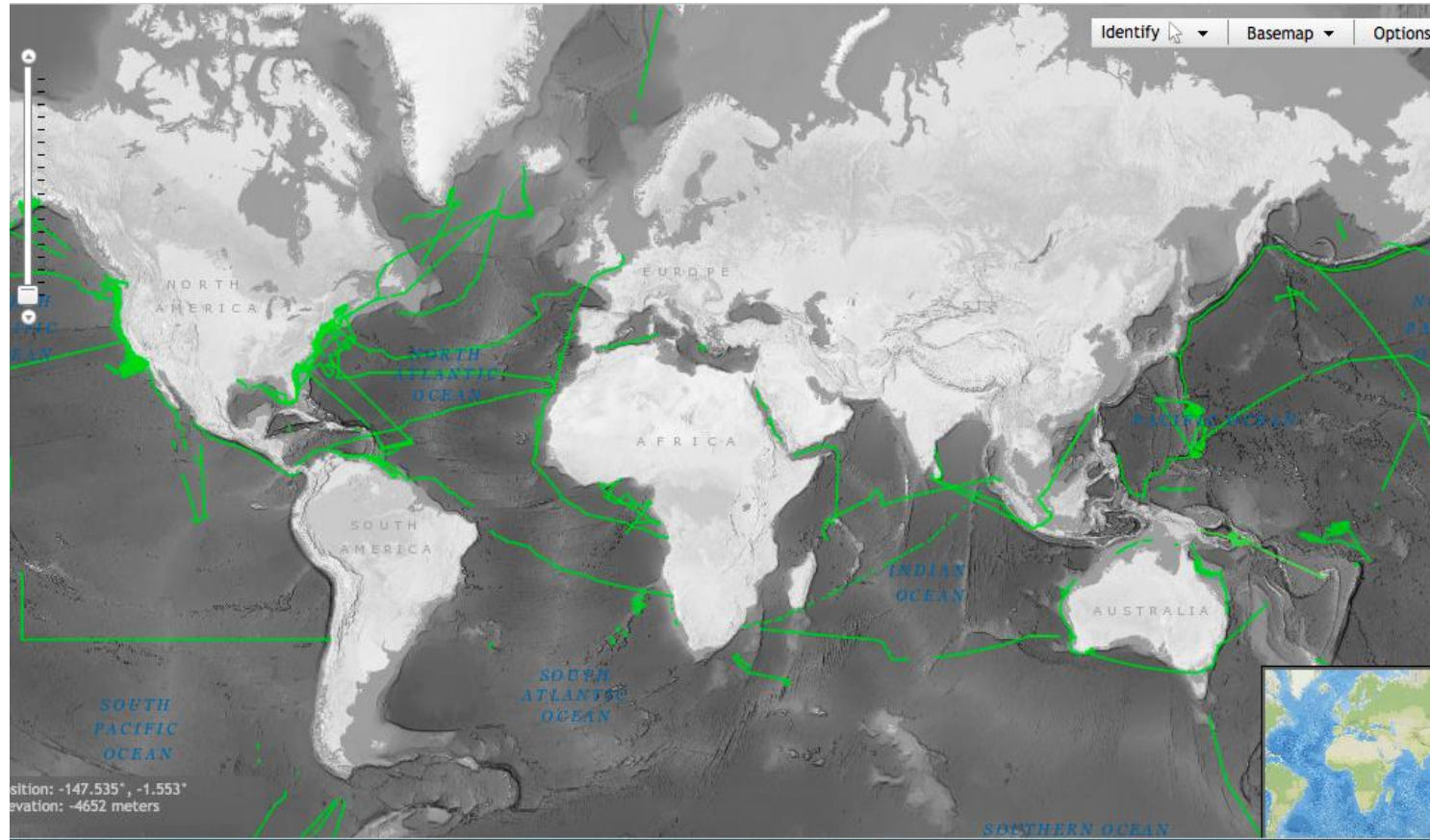


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# DCDB Data Holdings

## Multibeam Bathymetry Data Contributions in 2021

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**U.S. Academic Research Fleet (ARF): 47 surveys**

**Fugro: 26 surveys**

**NOAA Fleet: 17 surveys**

**LDEO MGDS - 29 surveys**

**GEOMAR: 2 surveys**

**Caladan/5 Deeps: 73 surveys/data packages**



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# DCDB Data Holdings

## Crowdsourced Bathymetry



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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

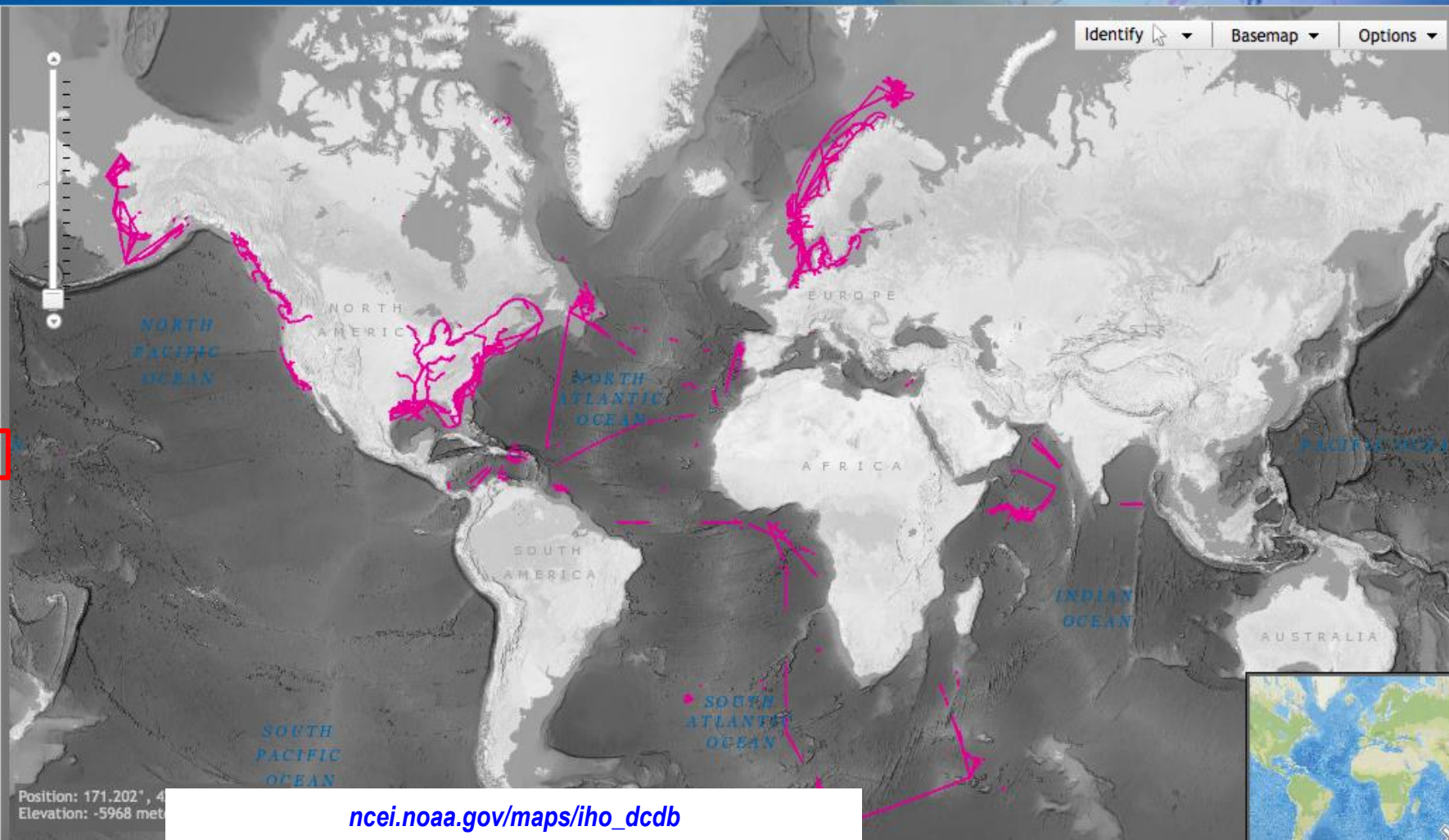
##### EMODnet

- Australia
- Canada
- France
- Germany
- Japan

Grid Extract

More Information

Help



- Mercator
- Arctic
- Antarctic

Identify Basemap Options

Position: 171.202°, 4  
Elevation: -5968 met

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



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# DCDB Data Holdings

## Current CSB Data Contributors

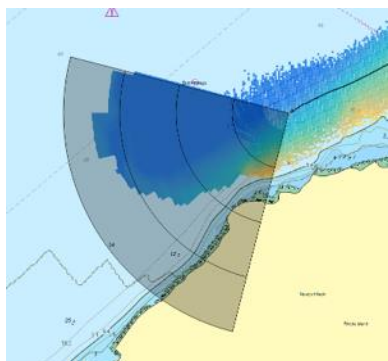
International Hydrographic Organization



[www.rosepointnav.com](http://www.rosepointnav.com)



Voyage Data Recorder



### Rose Point Navigation System

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

### MacGregor/Carnival Cruise Line

- Data provided by Voyage Data Recorders (VDR) logging depth sounding data.

### FarSounder Inc.

- Manufactures 3D Forward Looking Sonar; Some clients have agreed to ALSO collect/contribute CSB

### Petroleum Geo-Services (PGS)

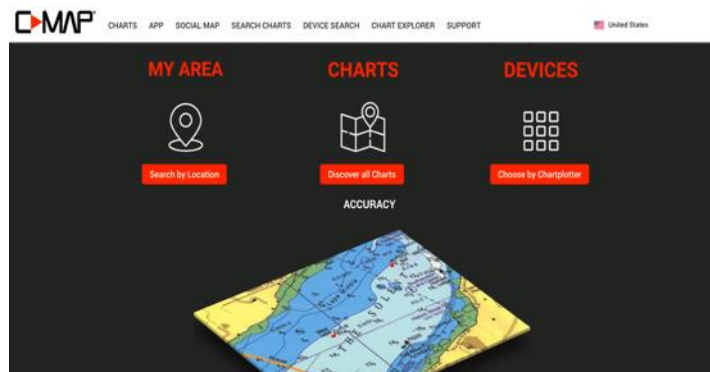
- Bathymetric feed from PGS vessels to the DCDB

### Navico C-MAP

- Bathymetric feed from C-MAP customers to the DCDB

### M2Ocean

- The HydroBall buoy is an autonomous bathymetric data acquisition solution





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# DCDB Data Holdings

## In Process CSB Data Contributors

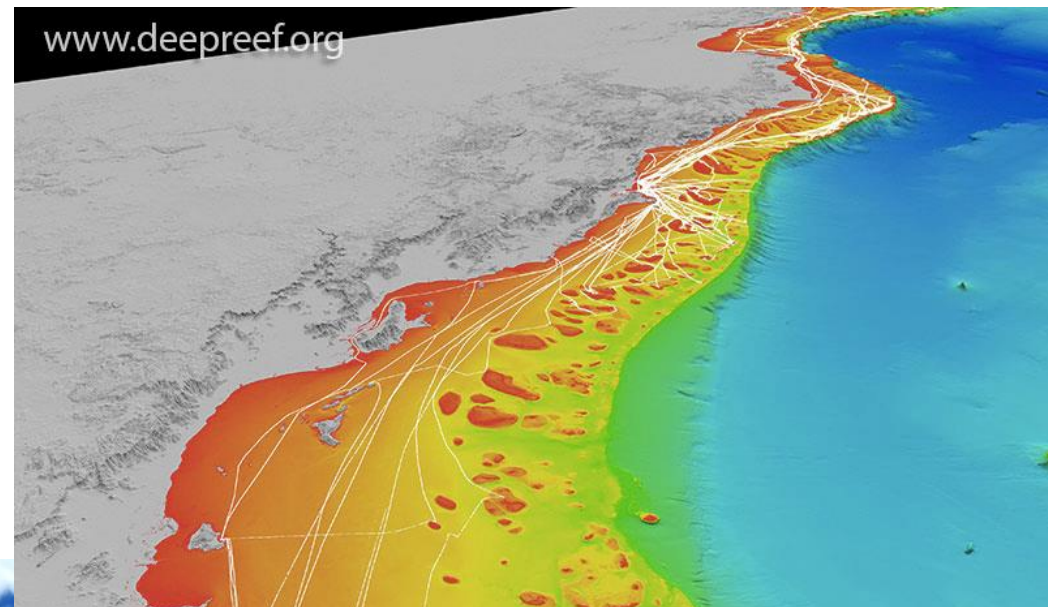
International  
Hydrographic  
Organization

### James Cook University (Australia)

- An early pioneer in CSB activities along the Great Barrier Reef
- Data has been submitted to the DCDB
- Awaiting *(interpretation of)* Australia's *(positive)* response to IHO CL 21/2020

### Data Submission Testing Currently Underway:

- Seabed 2030 Project
- Orange Force Marine
- Great Lakes Observing System



Vessel tracks  
along the northern  
GBR



OFM Orange Apex







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# DCDB Map Viewer

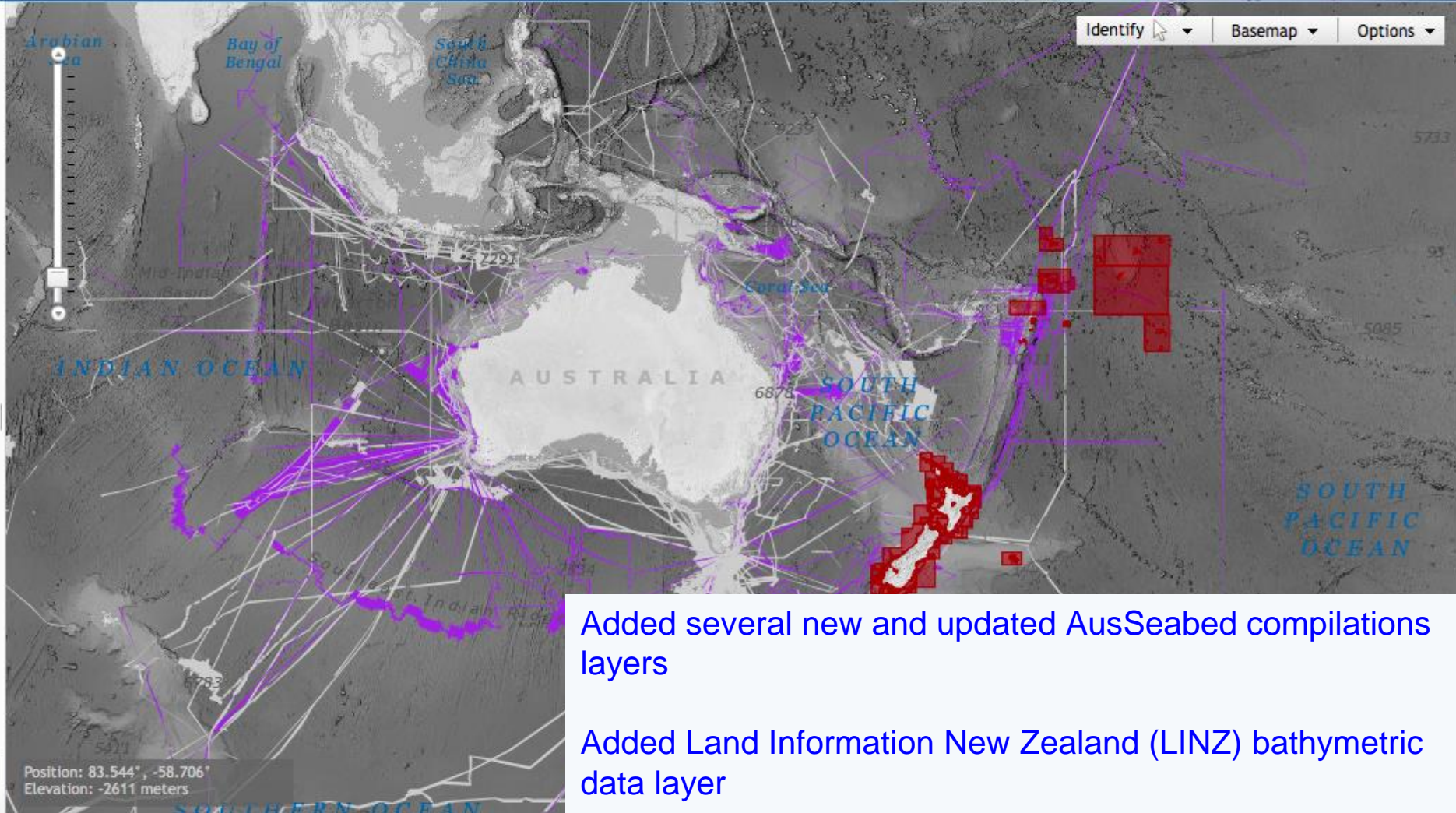
## Improvements and updates (Highlights) - Web Services



**Layers**

- ▶ IHO DCDB/NOAA NCEI ?
- ▶ EMODnet
- ▼ Australia
  - AusSeabed Bathymetry Holdings ?
  - AusSeabed Bathymetry Holdings (Compilations) ?
  - AusSeabed 50m Multibeam 2018 ?
  - AusSeabed MH370 Phase 1 Data 150m ?
  - AusSeabed Great Barrier Reef Bathymetry 2018 30m ?
  - AusSeabed Northern Australia Bathymetry 2018 30m ?
  - AusSeabed Multibeam Bathymetry of Australia 2015 5m ?
- ▶ Canada
- ▶ France
- ▶ Japan
- ▶ Netherlands
- ▼ New Zealand
  - LINZ Bathymetric Data Index ?
  - LINZ Bathymetric Surface Model Index ?
- ▶ United Kingdom
- ▶ Known Non-Public Data ?
- ▶ Bathymetric Coverage Maps

More Information  
Help



Mercator  
Arctic  
Antarctic

Added several new and updated AusSeabed compilations layers

Added Land Information New Zealand (LINZ) bathymetric data layer



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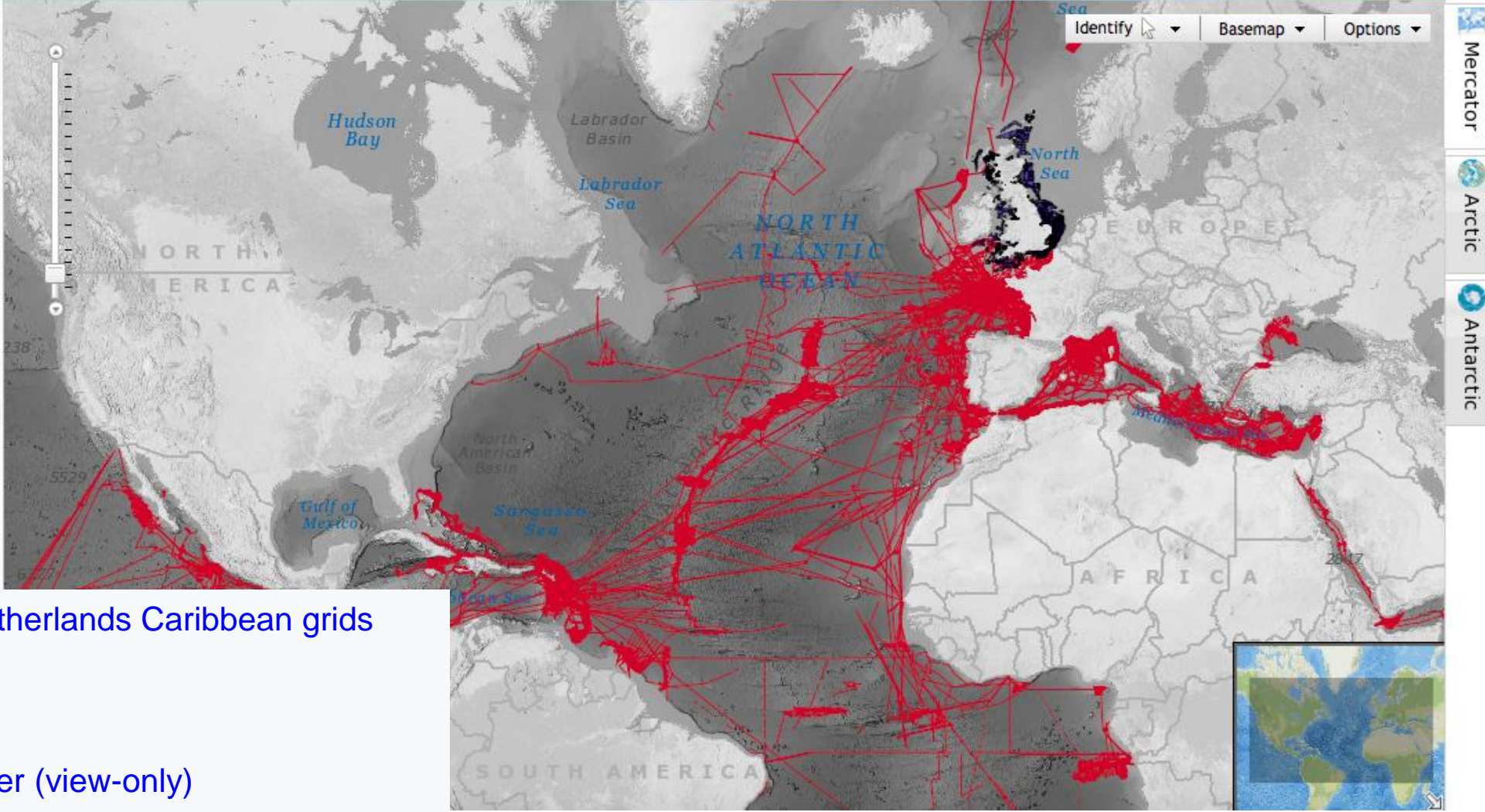
# DCDB Map Viewer

Improvements and updates (Highlights) - *Web Services*



**Layers**

- ▶ IHO DCDB/NOAA NCEI ?
- ▶ EMODnet
- ▶ Australia
- ▶ Canada
- ▼ France
  - IFREMER RAW Multibeam ?
  - SHOM Bathymetric Grids ?
- ▶ Japan
- ▼ Netherlands
  - Netherlands Caribbean Grids ?
- ▶ New Zealand
- ▼ United Kingdom
  - UKHO Bathymetric Survey Coverage ?
- ▶ Known Non-Public Data ?
- ▶ Bathymetric Coverage Maps



- Updated WMS endpoints for Netherlands Caribbean grids
- Added UKHO layer (view-only)
- Added IFREMER multibeam layer (view-only)



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# DCDB Map Viewer

Improvements and updates (Highlights) - *Grid Extract*



Layers

**Grid Extract**

► Help

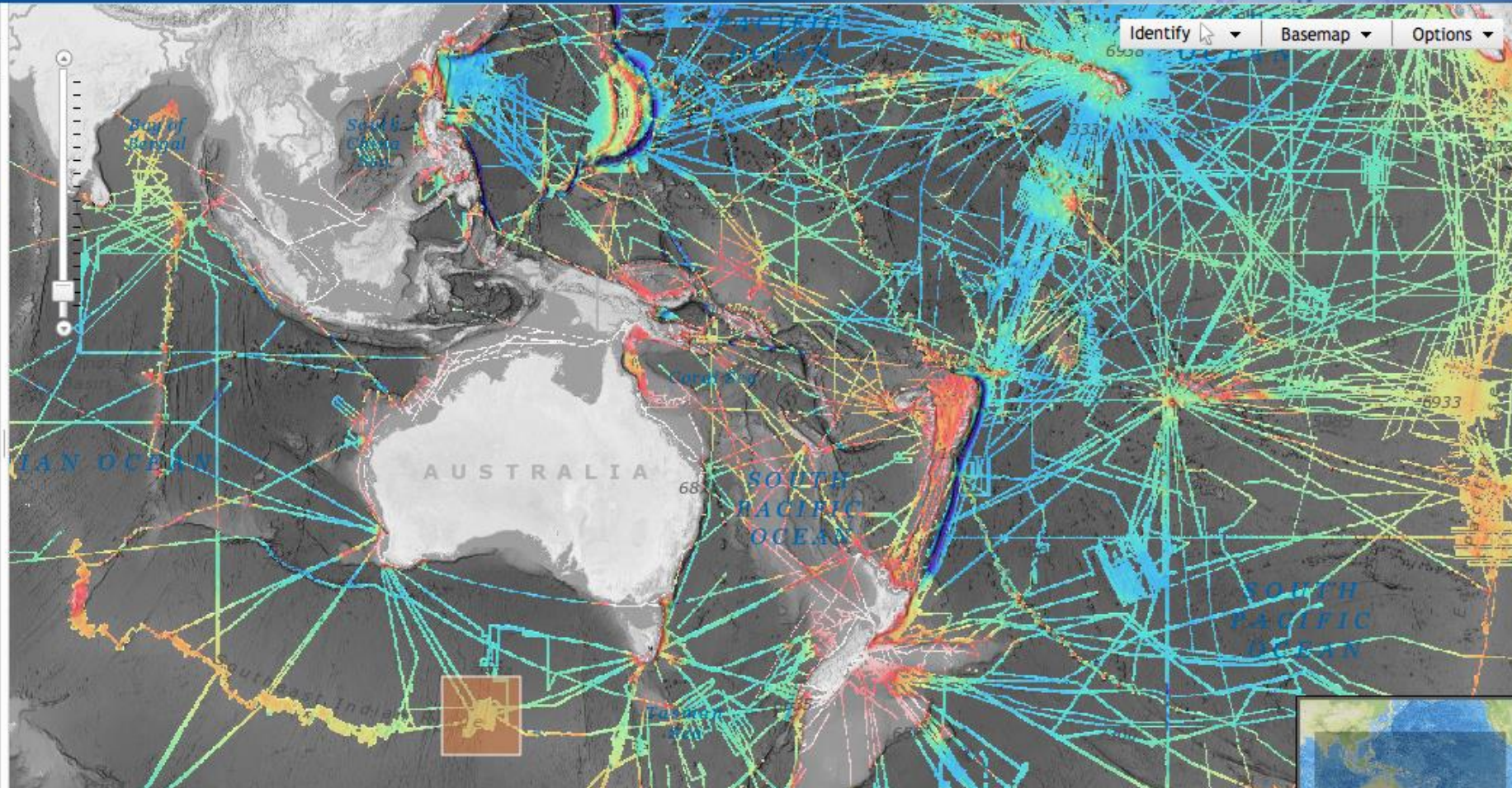
Multibeam Mosaic ▾

Extract a bathymetric grid from the [NCEI Multibeam Bathymetry Mosaic](#). The depth values are in meters, stored as 32-bit floating point values. The cell size is 3 arcseconds (approx. 90m).

Area of Interest: 122.29, -51.74, 131.79, -45.48

Output image dimensions: 11391 x 7518 pixels

[Download Data](#) ←



Identify ▾ Basemap ▾ Options ▾

- Mercator
- Arctic
- Antarctic

exportImage.tiff ^

Show All X



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# IHO DCDB Infrastructure & Map Viewer

## Improvements and updates (Highlights) - CSB-specific enhancements



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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
- EMODnet
- Australia
- Canada
- France
- Germany
- Japan
- Grid Extract
- More Information
- Help

Identified Features (135)

- Crowdsourced Bathymetry Files (135)
  - 2019-08-29T16:28 - 2019-09-04T05:33
  - 2019-08-28T16:14 - 2019-08-29T06:05
  - 2019-08-24T20:32 - 2019-08-28T03:02
  - 2019-08-23T21:56 - 2019-08-24T20:32
  - 2019-08-22T05:13 - 2019-08-22T19:41
  - 2019-08-21T14:23 - 2019-08-28T16:13
  - 2019-08-21T03:49 - 2019-08-22T01:41
  - 2019-08-16T15:54 - 2019-08-21T03:48
  - 2019-08-13T22:32 - 2019-08-16T15:53
  - 2019-08-10T05:03 - 2019-08-18T05:19
  - 2019-08-10T03:13 - 2019-08-13T22:32
  - 2019-08-07T18:32 - 2019-12-27T00:00
  - 2019-08-07T16:18 - 2019-08-08T15:17

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.**

OK Cancel



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# IHO DCDB Infrastructure & Map Viewer

## Improvements and updates (Highlights) - CSB-specific enhancements

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Visualizing and accessing CSB data from a cloud-hosted point store would allow users to:

- Generate bathymetric grids of a given area
- Using user-specified resolution, retrieve data density information,
- Better support the guiding of future data collection efforts.

**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.**

OK Cancel



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# IHO DCDB Infrastructure

## Planned Enhancements (Highlights)

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- Deploy new multibeam data pipeline to allow for greater ease in ingesting new data (new data formats, greater data volumes) and provide simplified data delivery to the users.
- Expand point store to include multibeam
  - AutoGrid is a web app which creates user specified grids from the DCDB multibeam archive.
  - AutoGrid 2.0 will run in the cloud and include multibeam and CSB data (future versions will also include singlebeam and possibly lidar).

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA > NESDIS > NCEI > Maps > Multibeam Bathymetry

AutoGrid

Email: (required)  
  
[Privacy Act Statement](#)

About AutoGrid  
This program creates grids and map images from multibeam bathymetry data. Three grid types are created:  
• NetCDF binary grid  
• ESRI ASCII Raster grid  
• XYZ (lon/lat/depth) grid.  
Map images are produced in postscript, pdf, jpg, png, and gif formats.  
To create a new map, use the interface to provide the following:  
• Your email address  
• Area of Interest  
• Parameters for the request using the options tabs below  
• Select "Submit Request" button  
To define an area of interest, select either the Draw Rectangle or Define Bounding Box tools in the Area of Interest menu at the upper-right of the map.  
Draw Rectangle: click and drag to draw a box (note: not available on the Arctic view).  
Define Bounding Box: define a bounding box by entering the geographic limits in signed decimal degrees. Longitudes in the western hemisphere are specified with negative values, as are latitudes in the southern hemisphere.  
Due to processing capacity, your request must abide by a few limits. Your request will not be submitted if the following conditions are not met:  
• total number of grid cells must be less than 2,500,000  
• total number of survey lines must be less than  
Grid Options  
Output Map Options  
Help

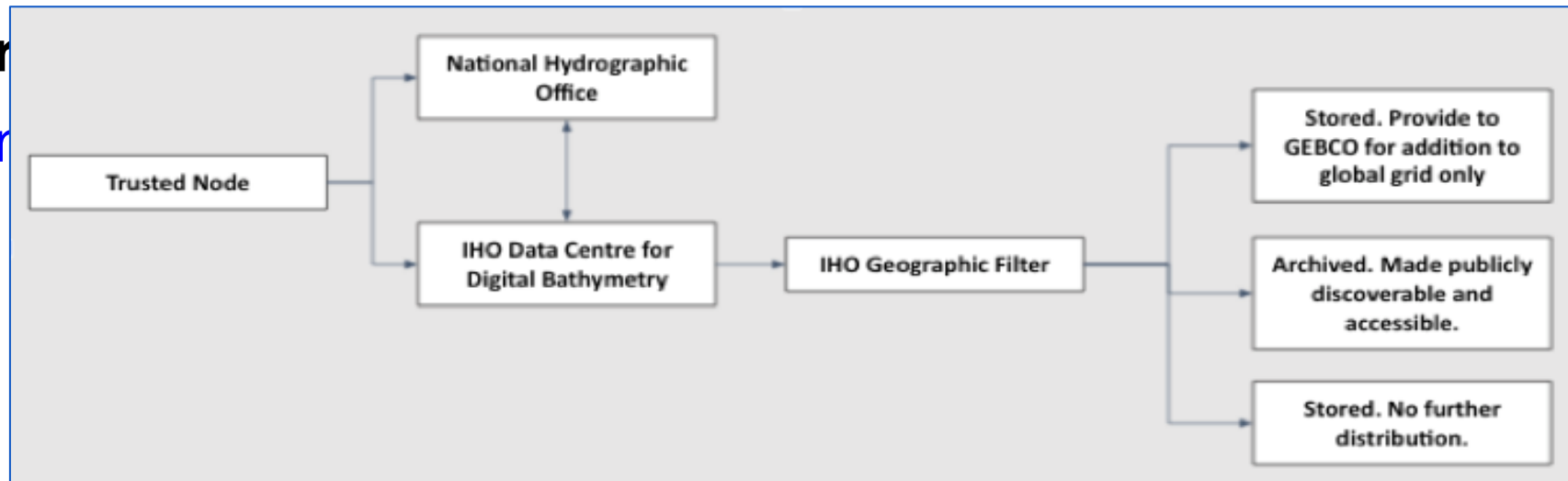
[ncei.noaa.gov/maps/autogrid/](https://ncei.noaa.gov/maps/autogrid/)



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# IHO DCDB In Planned Enhancements

International Hydrographic Organization



## CSB Geographic Filter:

- In response to feedback provided to IHO CL 11/2019, IHO CL 21/2020 and IRCC CL 1/2020, 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.
- Currently working to automate 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

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		2020-03-28T03:08:33Z	2020-03-28T03:10:16Z	20220322085844674039_9221566-AIDAAURA-oyHjp011.tar.gz	965	2022-03-28T21:17:48.738516Z
000042ca-d435-4d84-aea4-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



A web tool that allows the public to search for, view, and download information on more than 3800 undersea features.

Began development on Gaz v5.0 which will provide interoperability with the Beta-Gazetteer developed by the KHOA

[ngdc.noaa.gov/gazetteer](http://ngdc.noaa.gov/gazetteer)

**GEBCO**  
Undersea Feature Names Gazetteer

Undersea Feature Search

Specific Term

Generic Term (?)

Proposer

Discoverer

Assoc. Meeting

Search results: 4377 features found.

- Abbott Seamount
- Abraham Canyon
- Abroihos Ridge
- Abroihos Shelf
- Abubacer Ridge
- Aby Canyon
- Acapulco Seamounts
- Aceste Seamount
- Aconcagua Canyon
- Açor Bank
- Açores Este Fracture Zone
- Açu Canyon
- Adak Canyon
- Adams Seamount
- Adana Trough
- Adare Basin
- Adare Trough
- Adelaide Bank
- Adieu Canyon
- Admiral'teystvo Rise
- Admiral'teystvo Trough
- Admiralty Guyot

Select Area ▾ Options ▾

Arctic  
Antarctic

Depth: 4841.68 meters  
039° 48.02' W, 20° 46.11' N

Name Kane Fracture Zone

Proposed By

Discovered By

Last Updated 2010-01-01

Associated Meeting(s)

Origin of Name





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# Data Submission Agreements

International  
Hydrographic  
Organization

- The IHO will now serve as the signatory for the IHO CSB Trusted Node Agreement Forms and non-CSB data submission agreement forms when determined necessary (e.g.: with the International Seabed Authority).
- Key driver: to reassure potential data contributors that it was the IHO they were partnering with.

International Hydrographic Organization  
Crowdsourced Bathymetry Trusted Node  
**AGREEMENT**

*Terms of the Provision of Crowdsourced Bathymetry Data*

FROM

**Trusted Node Name**

TO THE

International Hydrographic Organization

FOR INCLUSION IN THE

IHO Data Centre for Digital Bathymetry Archive

Date

**DATA SUBMISSION AGREEMENT**

***BETWEEN THE***

**International Seabed Authority**

***AND THE***

**International Hydrographic Organization**

**FOR INCLUSION IN THE**

**IHO Data Centre for Digital Bathymetry Archive**

May 2022



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# Any Other Items of Note

## SPI Reporting

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After providing annual data contribution metrics to several RHCs (and the IHO) on an ad hoc basis, the DCDB intends to produce regional breakdowns of DCDB data holdings using RHC limits as part of SPI reporting.

The communication of these metrics to the RHCs has yet to be determined.

### Response to ARHC request:

“The IHO DCDB currently makes available to the public data approximating 8.5% (1,227,320 km<sup>2</sup>) of the Arctic Ocean, an increase from approximately 8.4% (1,218,910 km<sup>2</sup>) in 2020.”

### Response to IHO Request:

1. In 2020, HO-dataset contributions made up 16% of the DCDB's singlebeam bathy data holdings.
1. HO's currently make up 6% of singlebeam bathy data providers (15 HOs out of 236 unique institutions).
1. In 2020, HO-dataset contributions made up 0% of the DCDB's multibeam data holdings.
1. In 2020, HO-dataset contributions made up 0% of the DCDB's crowdsourced bathymetry data holdings.



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# Conclusions and Recommended Actions

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It is highlighted that the DCDB is an IHO Member States' resource that requires additional data to increase the coverage and move towards a comprehensive global bathymetric dataset.

Therefore IHO Member States and stakeholders are ***invited to contribute and encourage the provision of bathymetric data regardless of its origin or reason for gathering.***



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# **Actions Requested of IRCC**

International  
Hydrographic  
Organization

- a) Note the contents of this report;
- b) Encourage Member State and stakeholder bathymetric data contributions to the DCDB, regardless of origin;
- c) Take any other action it considers appropriate.