The **IHO DCDB** is the recognized IHO repository for all ocean bathymetric data collected by hydrographic, oceanographic and other vessels.

**NOAA’s NCEI (formally NGDC) has hosted the DCDB since 1990.**

Data are sent to the IHO DCDB, where we provide long term archive and data management.

**Pages currently under development**

www.ngdc.noaa.gov/inho/

**test pages:**

https://www.ngdc.noaa.gov/inho/test/
Accessing data from the DCDB

The DCDB utilizes NCEI’s standard web services for promoting data access - both the discovery and delivery of data and metadata.
Contributing data to the DCDB

IHO Member States and other organizations can contribute bathymetric data and metadata:

- **Raw sonar data**: all original manufacturer's formats
- **Processed data**: BAG, NetCDF, tiff, xyz, sd, asc, etc.
- **Metadata**: XML or text

We accept bathymetric data via FTP, e-mail, or mail (hard drive, DVD).

Contact bathymetry@iho.int for more information on contributing data or sharing web services to the IHO DCDB. Refer to Submitting Marine Geophysical Data to the IHO DCDB for how to package and submit data.

Governments, organizations, academia, industry and individuals are encouraged to contribute data to the IHO DCDB. Bathymetric data and metadata can be submitted via File Transfer Protocol (FTP), email, or mail (hard drive) in the formats listed below. Other formats will be considered on a case-by-case basis.

- **Raw sonar data**: MGD77T or the original manufacturer's format
- **Processed data**: BAG, NetCDF, tiff, xyz, sd, asc, etc.
- **Metadata**: XML or text

Learn more about contributing crowdsourced bathymetry.

IHO Member States are invited (IHO Circular Letter 56/2009) to provide low density shallow water bathymetry for their coastal areas. A tool, developed and distributed with CDS2009, and available upon request, will facilitate the extraction of soundings and contours from Electronic Navigational Charts (ENC) cells. Only data from ENCs in navigational purpose bands 2 and 3 are requested.
Contributing data to the DCDB

Contact iho.datacentre@iho.int for more information on contributing data or viewing web services to the IHO DCDB. Refer to Submitting Marine Seophysical Data to the IHO DCDB for how to contribute and submit data.

Governments, organisations, academia, industry and individuals are encouraged to contribute data to the IHO DCDB. Bathymetric data and metadata can be submitted via File Transfer Protocol (FTP), email, or mail (hard drive) in the formats listed below. Other formats will be considered on a case-by-case basis.

- **Raw sonar data**: MGD77T or the original manufacturer’s format
- **Processed data**: DG, NetCDF, tif, xyz, asc, etc.
- **Metadata**: XML or text

Learn more about contributing crowdsourced bathymetry.

IHO Member States are invited (IHO Circular Letter 56/2009) to provide low density shallow water bathymetry for their coastal areas. A tool, developed and distributed with CE.35.2008E, and available upon request, will facilitate the extraction of soundings and contours from Electronic Navigational Charts (ENC) cells. Only data from ENCs in navigational purpose bands 2 and 3 are requested.
Contributing data to the DCDB

Data collection/management guidelines and metadata templates to encourage data collectors into becoming data providers.

- Metadata fields spreadsheet
- Requested directory structure

Data File Structure:
The data may be delivered in one archived file (e.g., tar or zip) or in a well-defined directory structure. Please include an MD5 checksum with the delivery so NCEI can verify the integrity of the files and the completeness of the data transfer. For questions regarding MD5 checksums, contact mb.info@noaa.gov.

A preferred data structure would be the following:

```xml
<ship name>
  <cruise ID>
    <cruise/>
    <metadata/>
      <cruise report/documentation>
    <multibeam/>
      <version 1/>
        <data/>
          <data>
            <raw (as collected) data files>
            <metadata/>
            <ancillary/>
              <S5P, raw tracklines, etc.>
        <version 2/>
          <data/>
            <processed data files>
            <metadata/>
            <ancillary/>
              <S5P, raw tracklines, etc.>
          <products/>
            <include grids, images or other derived products>
      <subbottom/>
        <data/>
          <include all top files>
        <metadata/>
        <wcss/>
          <data/>
            <include all raw files>
            <metadata/>
```

Data Submission:
Email mb.info@noaa.gov to alert the multibeam data manager of incoming data (multibeam, subbottom, wcss), set up your data submission, or ask any questions.

Data can be delivered to NCEI via (1) shipping external hard drives, (2) uploading to NCEI's FTP server, or (3) data copy using rsync through a secure shell login (linux).

1. External hard drives containing a data submission can be shipped to the following address:
   Evan Robertson
   NOAA NCEI
   325 Broadway E/NE42
   Boulder, CO 80305

2. NCEI maintains a number of public FTP servers. All the FTP servers allow anonymous FTP.
Contributing data to the DCDB

Governments, organizations, academia, industry and individuals are encouraged to contribute data to the IHO DCDB. Bathymetric data and metadata can be submitted via File Transfer Protocol (FTP), email, or mail (hard drive) in the formats listed below. Other formats will be considered on a case-by-case basis.

- Raw sonar data: MGD77T or the original manufacturer’s format
- Processed data: IAG, NaviCIP, IIF, XYZ, XSD, ASC, etc.
- Metadata: XML or text

Learn more about contributing crowdsourced bathymetry.

IHO Member States are invited (IHO Circular Letter 30/2006) to provide low density shallow water bathymetry for their coastal areas. A tool, developed and distributed with OI 36/2006, and available upon request, will facilitate the extraction of soundings and contours from Electronic Navigational Charts (ENC) cells. Only data from ENCs in navigational purpose bands 2 and 3 are requested.

CruisePack Software

NOAA NCEI is developing and testing CruisePack, a data packaging and metadata gathering software tool that simplifies how a data provider collects and submits cruise-based data. CruisePack features a simple user interface to centre package operation and facilitate metadata entry. Once the user completes metadata entry, data packaging is automatic. CruisePack copies the data, generates machine-readable JSON metadata records and creates a checksum manifest file, all contained in a structured data package conforming to the BagIt specification.

CruisePack aims to meet a growing community need to submit geophysical data efficiently and in a consistent format. This software is available upon request (mb.info@noaa.gov).
Contributing data to the DCDB

One tool to pack it all...

- Stand-alone packager for cruise-based data.
- Additional data types and instruments can be added with little or no modifications to code.
- Simple user interface with pulldown menus and controlled vocabularies
- Creates consistent BagIt format data packages complete with md5 checksum manifest files.
- Generates cruise-level and series level metadata files

Cruise Data Packager (CruisePack)

Aims to meet a growing need from the community to submit geophysical data to the archive efficiently, easily, and in a consistent format.
NCEI/DCDB worked with Fugro to identify metadata gaps and offer suggestions for improved data packaging to allow Fugro to provide a more complete product.

This has allowed Fugro to quickly identify a workflow and delivery method that promotes consistency across the fleet at almost zero cost to them.

Multibeam: 19 surveys, ~269 Gb
Water column sonar: 12 surveys, 457 Gb
Contributing data - IHO Crowdsourced Bathymetry Initiative

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

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

A Working Group was formed and tasked to develop an IHO publication (B-12 IHO Guidance on Crowdsourced Bathymetry) that states the IHO’s policy towards, and best practices for, the collection and contribution of CSB.
B-12 Edition 2.0.2

https://www.iho.int/ihopubs/bathy/B_12_Ed2.0.2_2019.pdf
IHO DCDB Pilot Project

• IHO DCDB and NOAA teamed up with Rose Point Navigation Systems

• Using their navigational system software, mariners can enable a modified electronic charting system log file to **record position, depth and time**.

• Mariners can capture metadata about vessel and equipment.

• Whenever the mariner updates the software or chart catalog, the data is sent to Rosepoint who then transmits the data to the DCDB via HTTPS post.
Data discovery and access via our map viewer.

Data delivered as a collection of files.

CSB data log file (with JSON metadata string)

Data and identifying token are submitted to DCDB via HTTP post

Frequent update of viewer
IHO DCDB CSB Pipeline

International Hydrographic Organization Data Centre for Digital Bathymetry

- Trusted Node (e.g., Rosepoint)
  - XYZ CSV GeoJSON
- HTTPS
- API
- Ingest Process
- GeoJSON Files
- Archive
- Spinning Disk
- Token Authentication
- Metadata Catalog
- Spatial Database
- ETL: Trackline Generation
- Data Access:
  - Web Applications, Map Viewers, Map Services
  - (Future: Point Store)
IHO DCDB CSB Data Holdings

- 154 million soundings
- 168 contributing vessels
- 6585 data deliveries
CSB Next Steps: *Bring on more trusted data providers!!!*

We are currently working with **FarSounder, Macgregor, James Cook University, and CIDCO**

About 47% of the 4.4 million km² of the Canadian Arctic is underwater and only 10% of these waters are adequately surveyed.
CSB Next Steps: *Bring on more trusted data providers!!!*

We are currently working with *FarSounder, Macgregor, James Cook University, and CIDCO*
CSB Data Flow (in a perfect world)

Figure 1. Data flow from vessels, through Trusted Nodes, to the DCDB.
Currently working to apply a set of topologically correct polygons for each EEZ & TS where each polygon is attributed with flags indicating the restriction(s) - YES/NO
Geographic Filtering

- Based on the results of IHO Circular Letter 11, described in CL 47, the DCDB will filter out CSB data collected from the waters of **all coastal countries not included on the positive list of 13**. This includes:
  - Countries we know are pro-CSB but haven't replied
  - Non-IHO member states
- Since CSB is stored as files (and NOT points), if any part of a file falls on or within a non-YES country’s EEZ, it will not be made available.
- In most cases: 1 survey = 1 file

*Canada recently submitted a positive response*
The DCDB utilizes NCEI’s standard web services for promoting data access - both the *discovery and delivery of data and metadata.*

https://maps.ngdc.noaa.gov/viewers/ihodcdb/
IHO DCDB = World Reference for Raw Bathymetry
**Next Steps**

- Expand beyond pilot data provider to include more trusted data providers in CSB project
- Continue to ingest *map services* to provide a more accurate representation of where data exists
- Continue to ingest, archive, create tracklines of where data was collected to visualize on map, and provide individual file-based delivery of data.

**VISION**

- To store ALL flavors of bathymetric data as a *seamless collection of points*
- Provide a variety of services, for ex:
  - Users can generate bathy grids of a given area using user-specified resolution
  - Show data density, guiding future data collection efforts
Topics we would like to see discussed this week...

1. Developing a data flow process between data contributors, the RDACC and the DCDB
   a. What’s the best way to get data to the DCDB?
   b. What’s the best way for the RDACC to access data from the DCDB?
   c. What additional map services can be ingested into the DCDB Viewer? (eg: JAMSTEC?)

2. How can we help you…
   a. contribute data to the DCDB?
   b. find and access data from the DCDB?
Thank you.

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