The IHO Data Centre for Digital Bathymetry

An Overview

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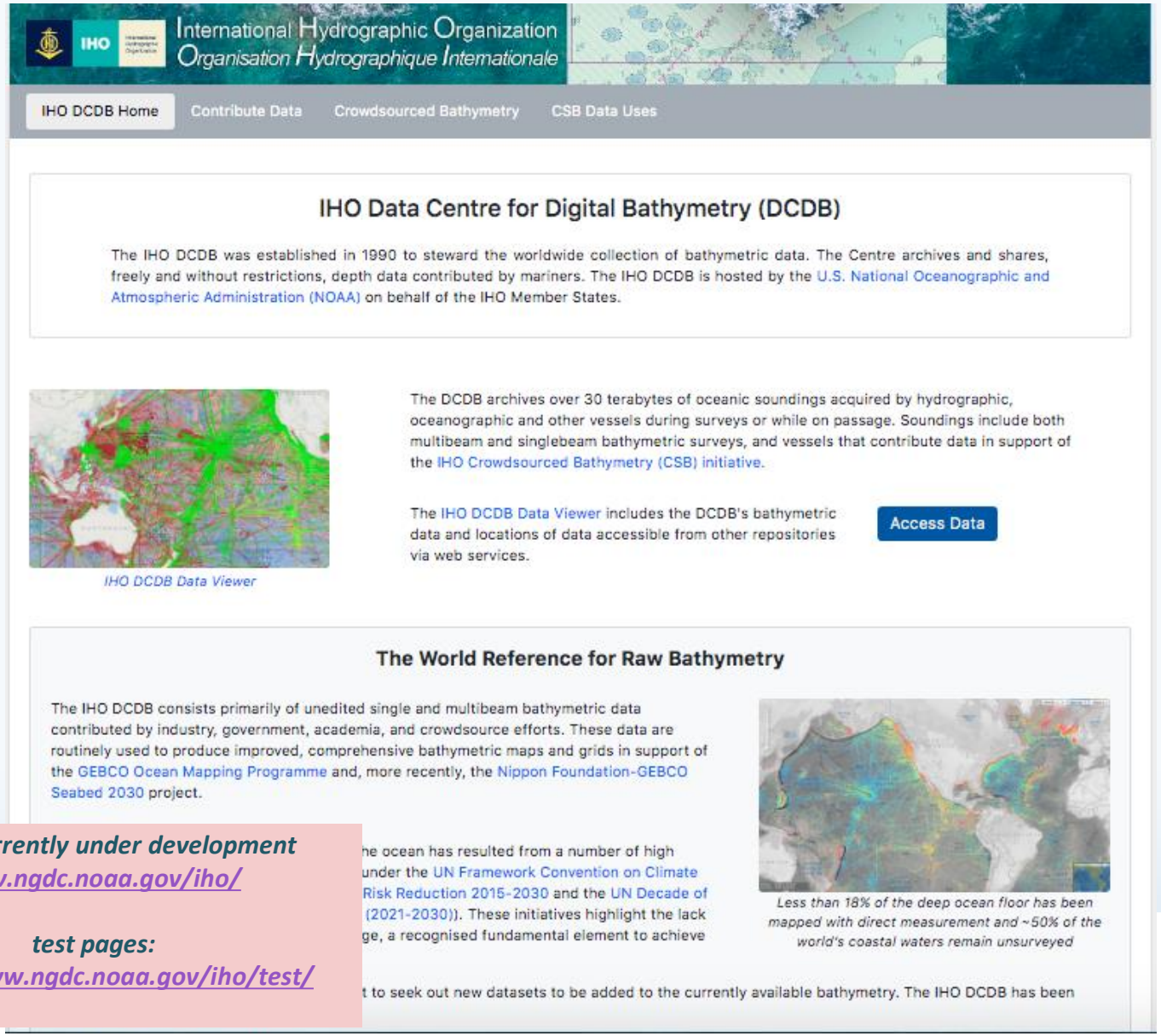
IHO Data Centre for Digital Bathymetry (DCDB)

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.

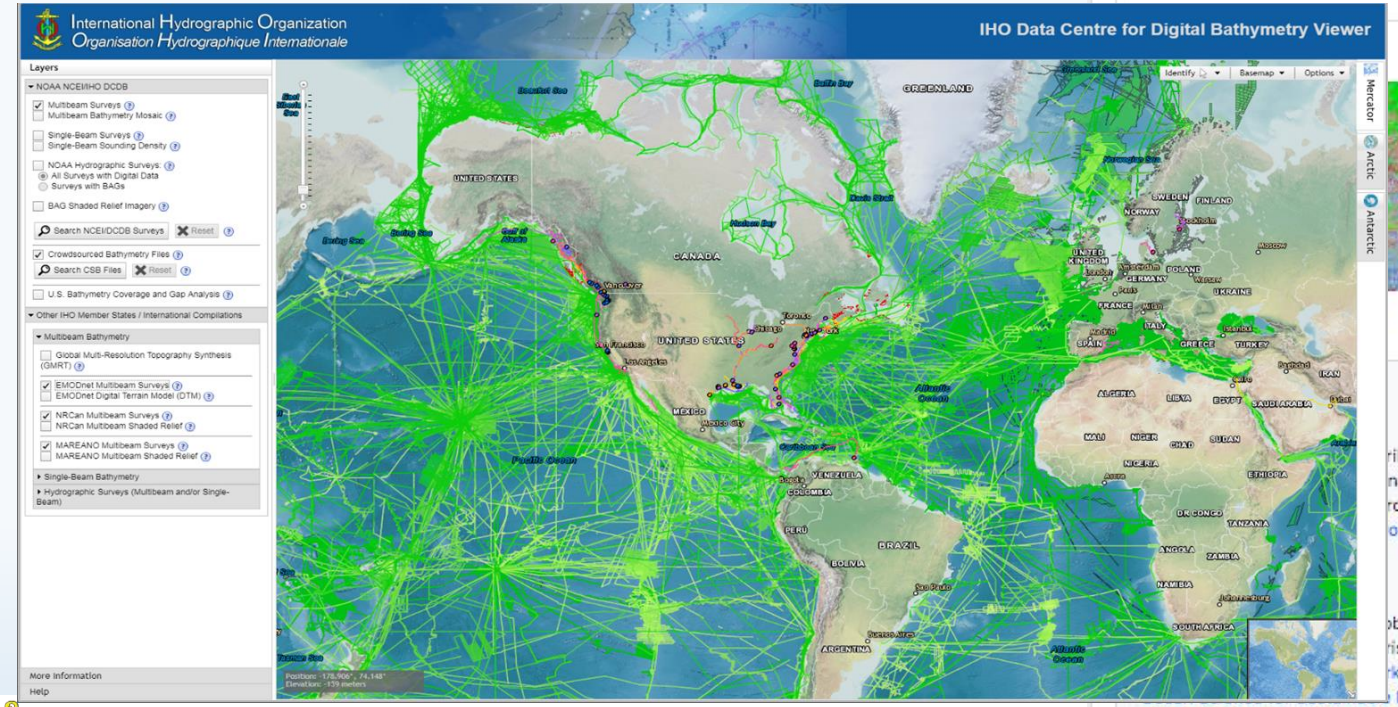


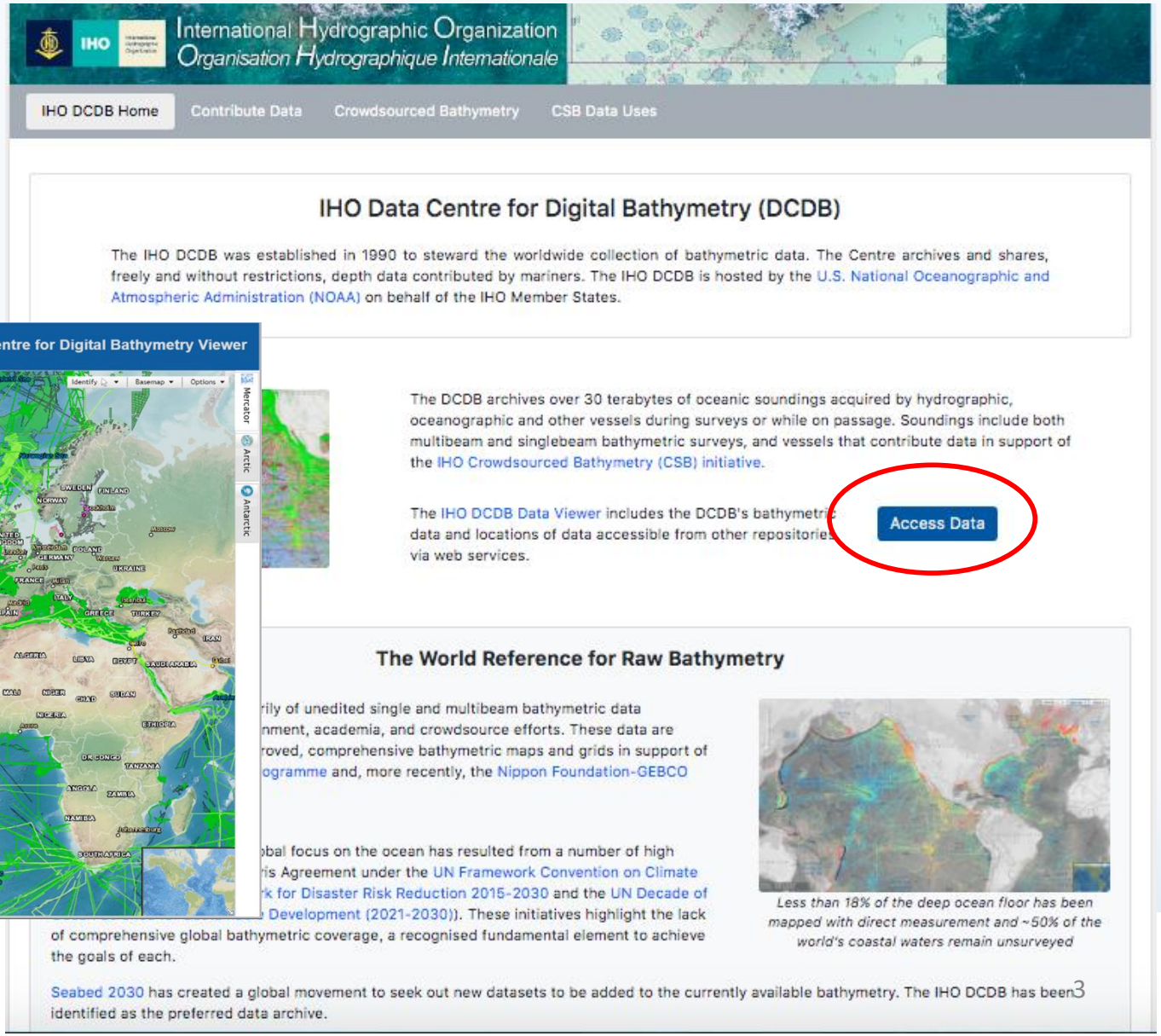
Pages currently under development
www.ngdc.noaa.gov/iho/

test pages:
https://www.ngdc.noaa.gov/iho/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.***



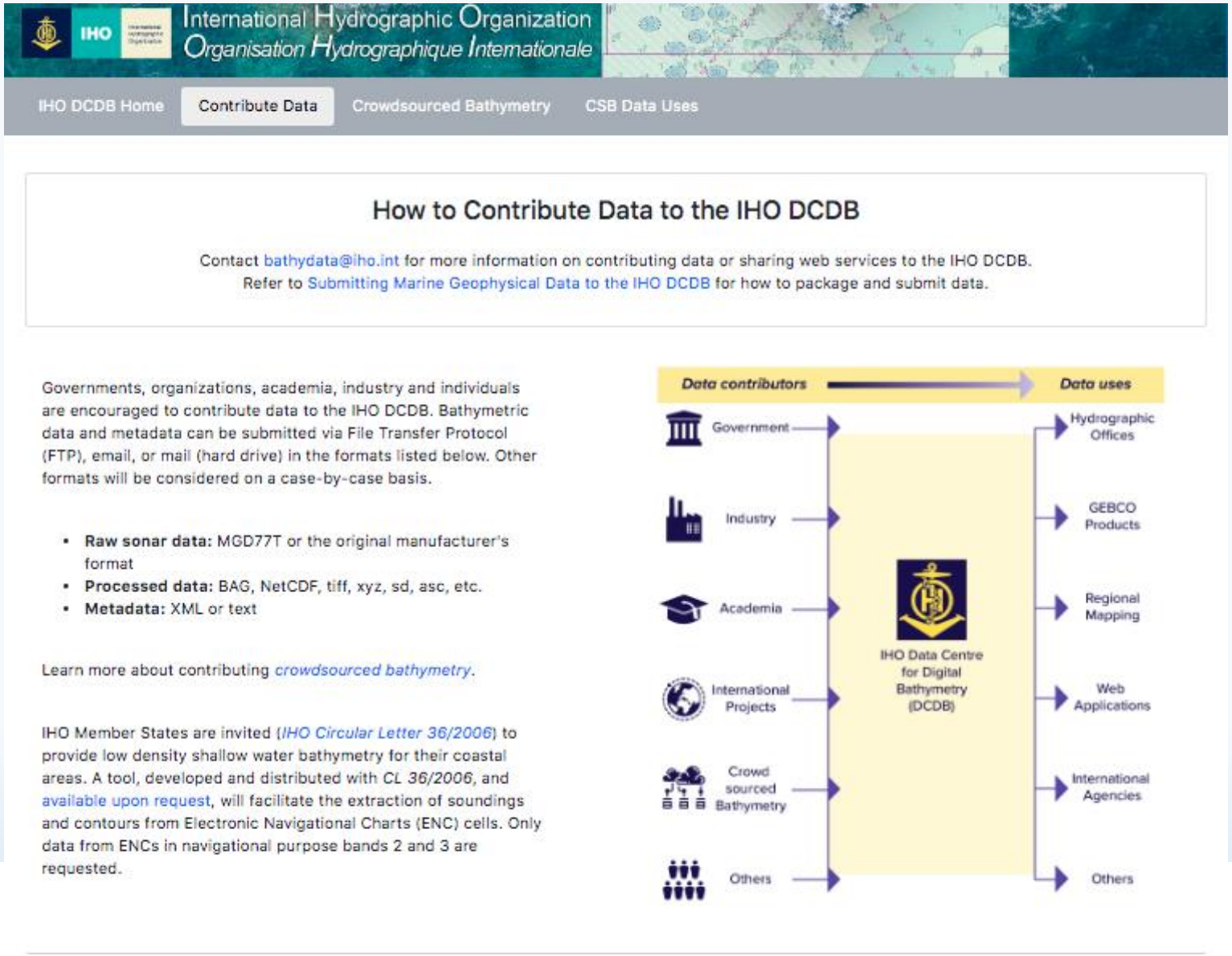


Contributing data to the DCDB

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).



Contributing data to the DCDB

IHO International Hydrographic Organization
Organisation Hydrographique Internationale

IHO DCDB Home | Contribute Data | Crowdsourced Bathymetry | CSB Data Uses

How to Contribute Data to the IHO DCDB

Contact bathydata@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.

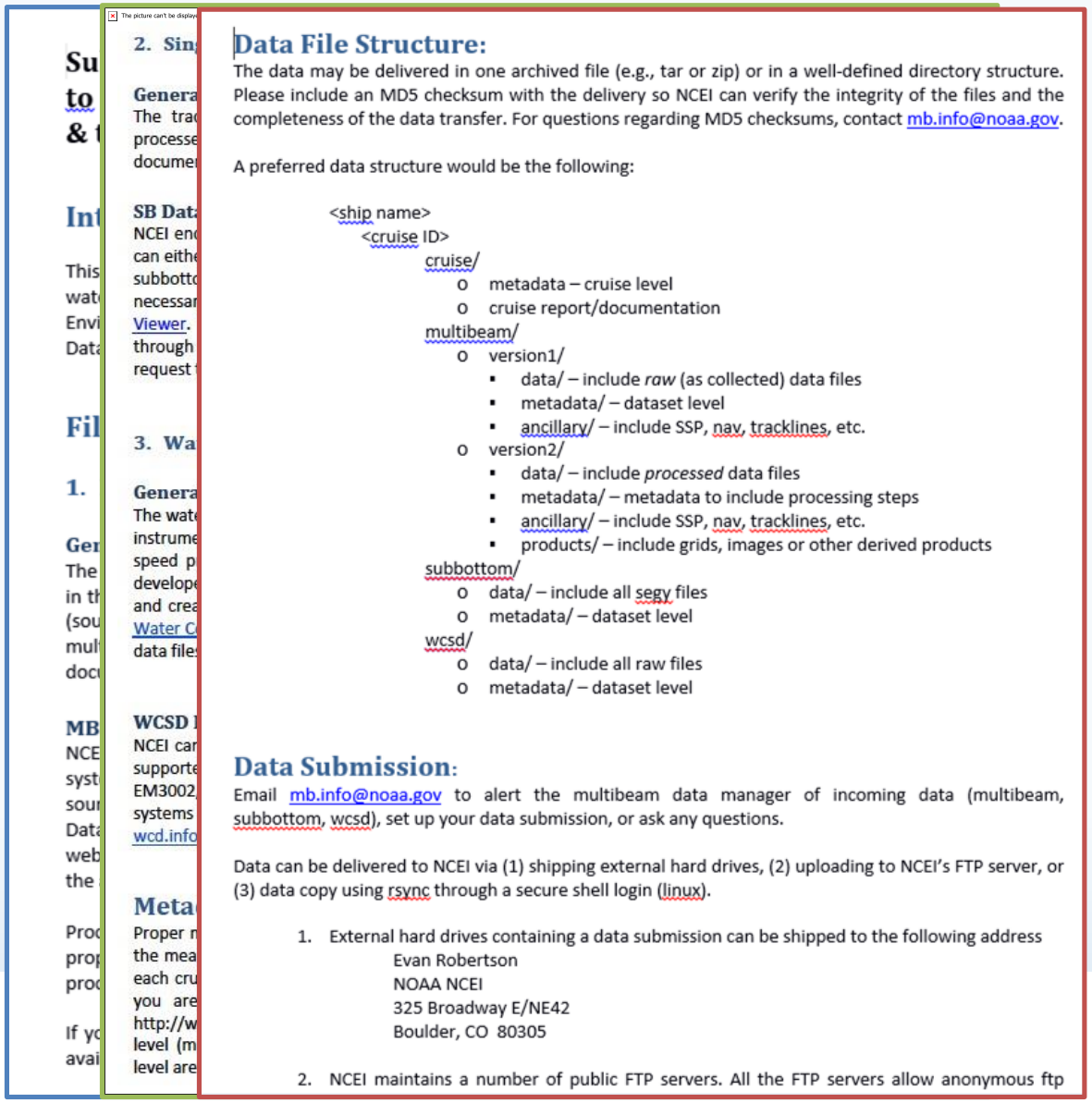
Governments, organizations, academia, industry and individuals are encouraged to contribute data to the IHO DCDB. Bathymetric data and metadata can be submitted via File Transfer Protocol (FTP), email, or mail (hard drive) in the formats listed below. Other formats will be considered on a case-by-case 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 36/2006*) to provide low density shallow water bathymetry for their coastal areas. A tool, developed and distributed with *CL 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.

Contributing data to the DCDB



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:

<ship name>
  <cruise ID>
    cruise/
      - metadata – cruise level
      - cruise report/documentation
    multibeam/
      - version1/
        - data/ – include *raw* (as collected) data files
        - metadata/ – dataset level
        - ancillary/ – include SSP, nav, tracklines, etc.
      - version2/
        - data/ – include *processed* data files
        - metadata/ – metadata to include processing steps
        - ancillary/ – include SSP, nav, tracklines, etc.
        - products/ – include grids, images or other derived products
    subbottom/
      - data/ – include all segy files
      - metadata/ – dataset level
    wcsd/
      - data/ – include all raw files
      - metadata/ – dataset level

Data Submission:

Email mb.info@noaa.gov to alert the multibeam data manager of incoming data (multibeam, subbottom, wcsd), 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

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

- Metadata fields spreadsheet
- Requested directory structure

Contributing data to the DCDB

Refer to Submitting Marine Geophysical Data to the IHO DCDB for how to package and submit data.

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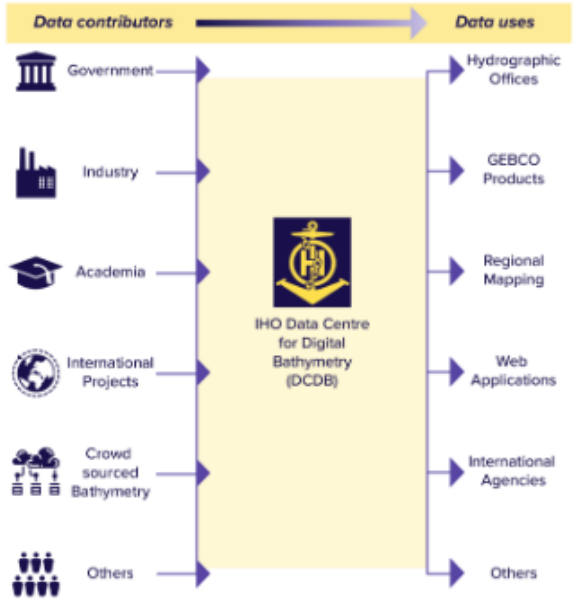
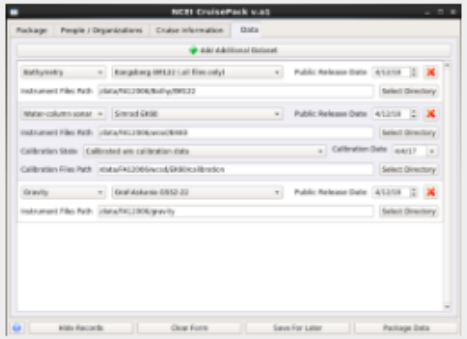




CruisePack Software

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 control packager operation and facilitate metadata entry. Once the user completes metadata entry, data packaging is automatic. CruisePack copies the data, generates machine-parseable JSON metadata records and creates a checksum manifest file; all contained in a structured data package conforming to the BagIt specification.

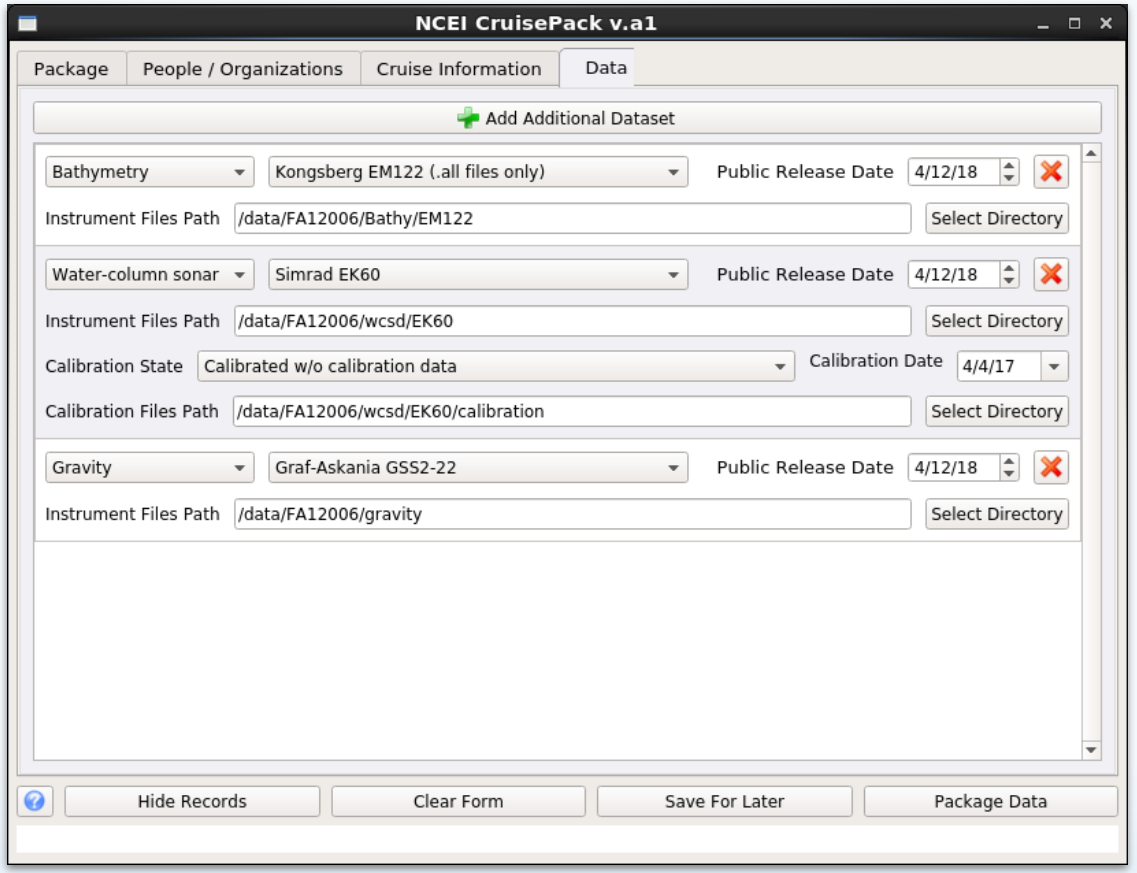
CruisePack aims to meet a growing community need to submit geophysical data efficiently and in a consistent format. This software is available upon request (mb.info@noaa.gov).

Contributing data to the DCDB

Cruise Data Packager (CruisePack)

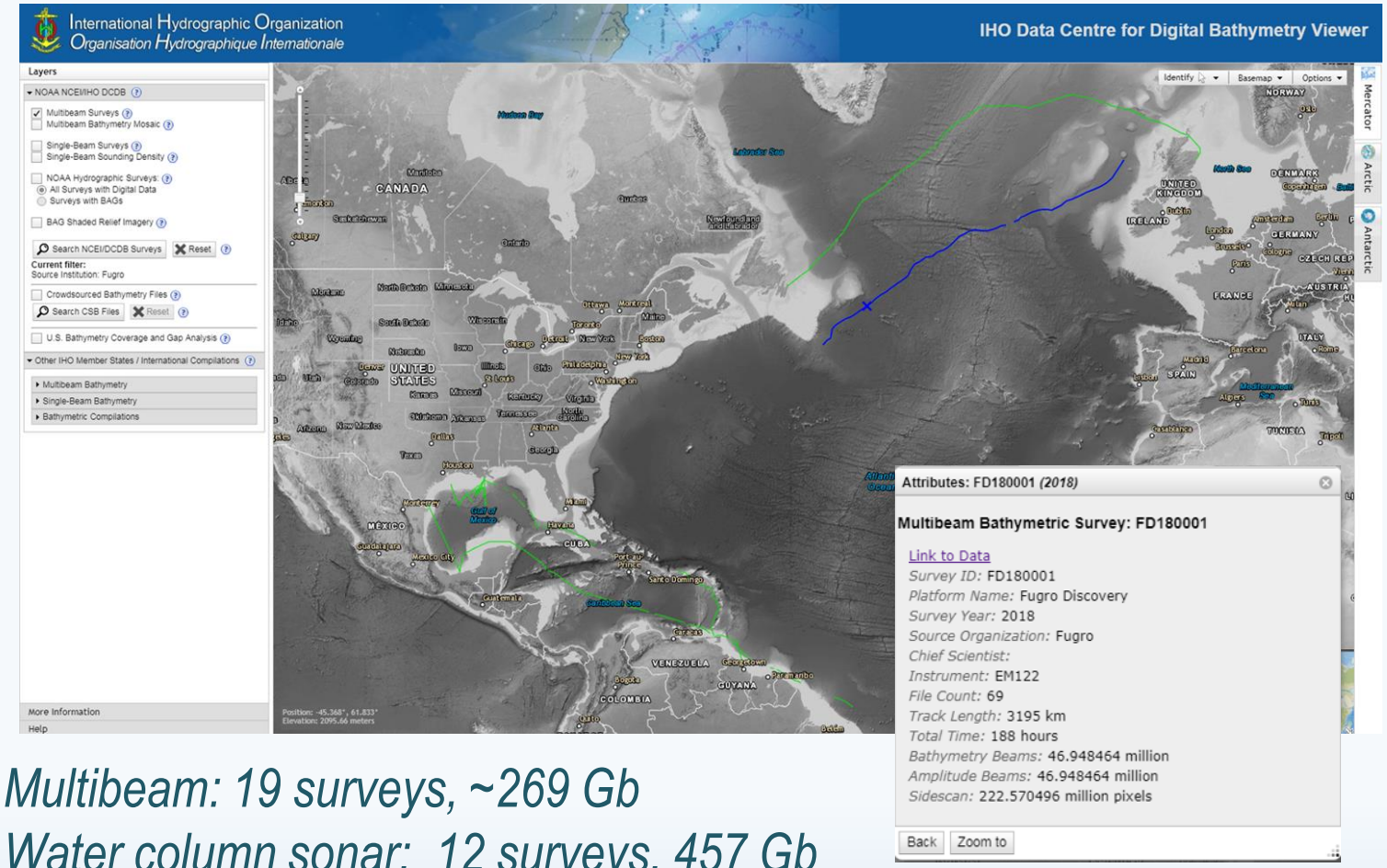
One tool to pack it all...

- 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



Aims to meet a growing need from the community to submit geophysical data to the archive efficiently, easily, and in a consistent format

Industry contributing data - *Fugro*



Multibeam: 19 surveys, ~269 Gb
Water column sonar: 12 surveys, 457 Gb

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.

Contributing data - *IHO Crowdsourced Bathymetry Initiative*

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

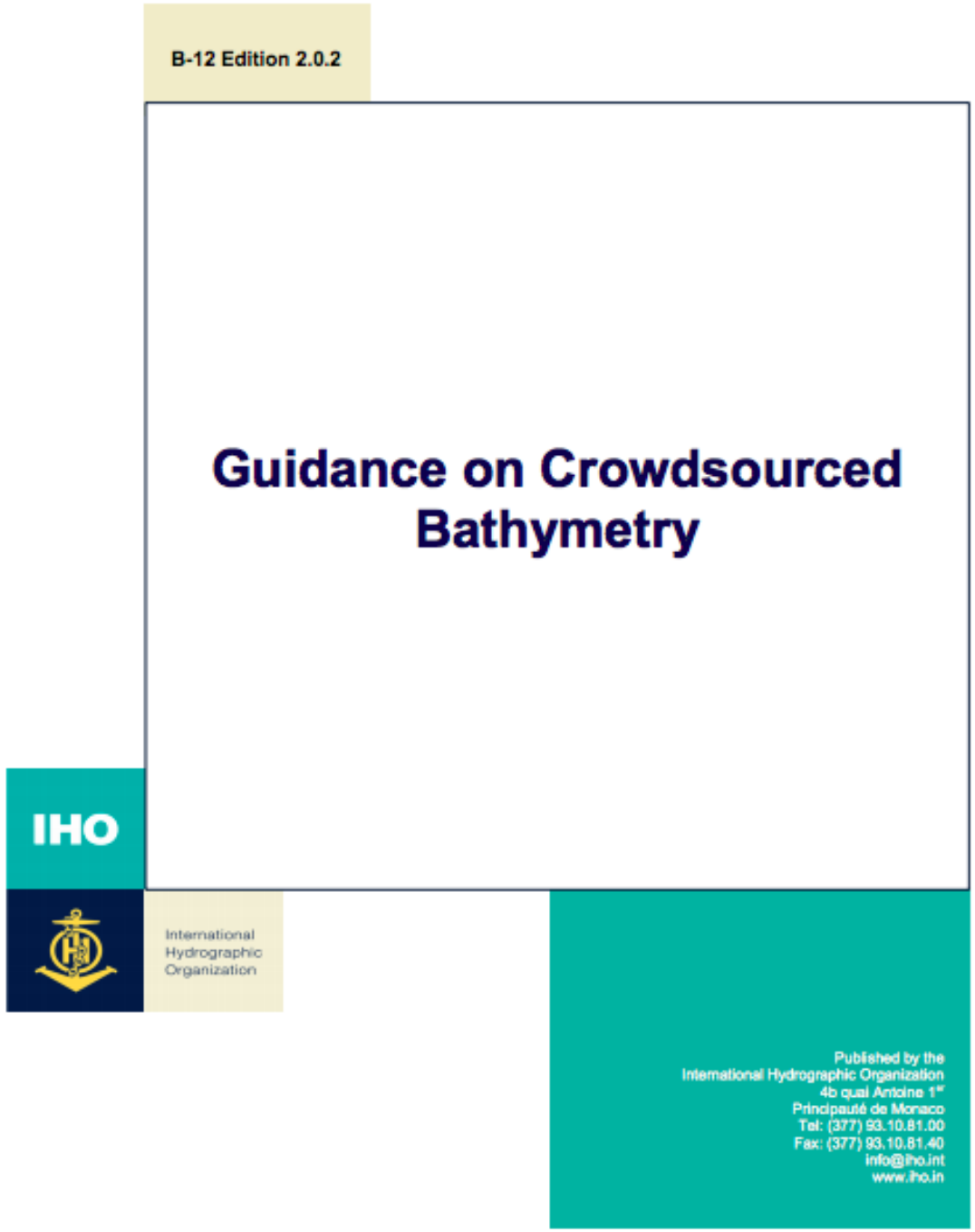
CSB is the collection of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations.

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

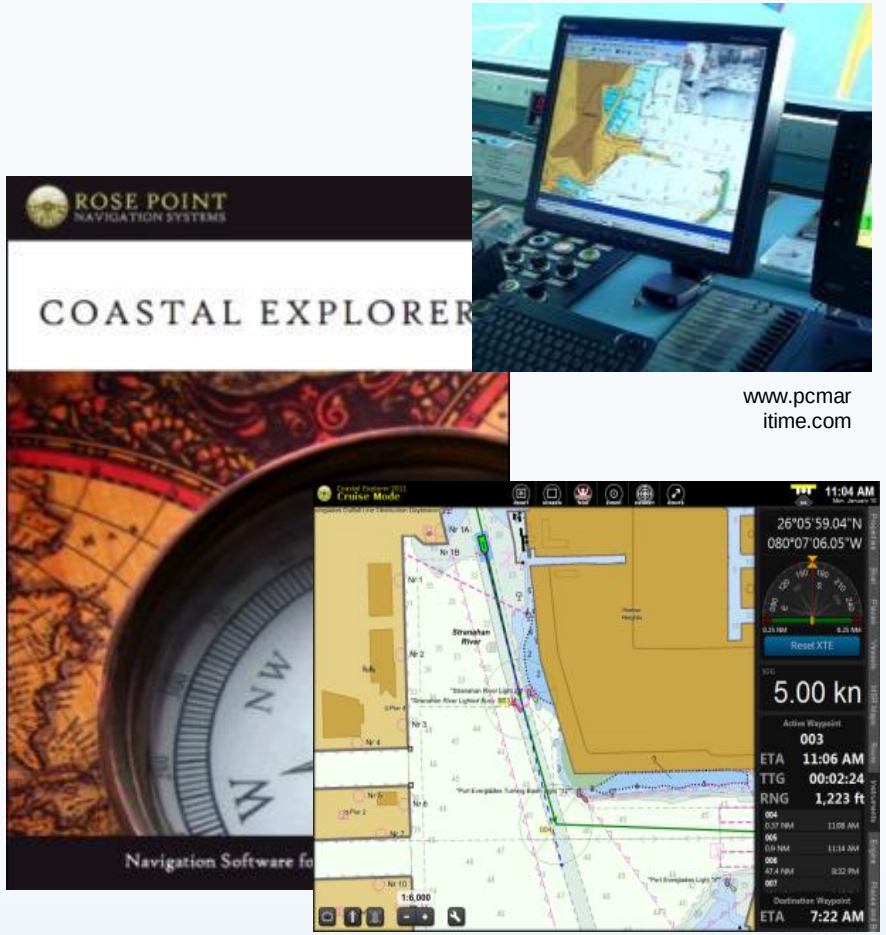
https://www.iho.int/iho_pubs/bathy/B_12_Ed2.0.2_2019.pdf

International Hydrographic Organization
Organisation Hydrographique Internationale



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.



www.pcmaritime.com

www.rosepointnav.com

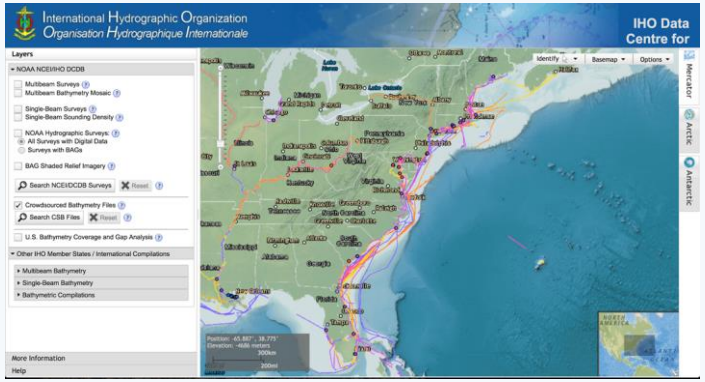
IHO DCDB CSB Pipeline

Data discovery and access via our map viewer.
<u>Data delivered as a collection of files.</u>


```
{
    "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)

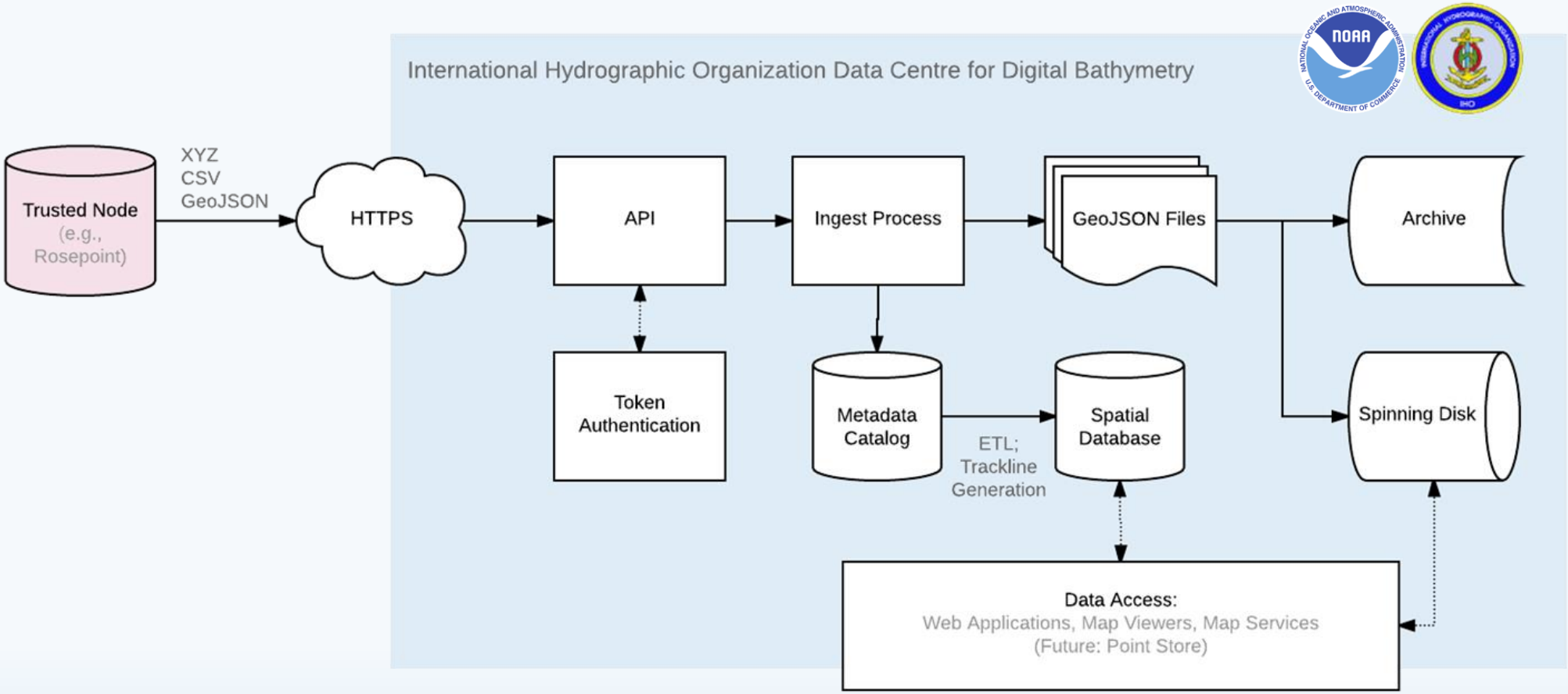

```
lat,lon,depth,time
47.666520,-122.098525,21.49,20161017T234638Z
47.666518,-122.098525,11.98,20161017T234739Z
47.666517,-122.098527,14.63,20161017T234839Z
47.666515,-122.098527,17.16,20161017T234935Z
47.666490,-122.098472,19.72,20161017T235044Z
47.666505,-122.098522,20.18,20161017T235141Z
47.666477,-122.098507,20.42,20161017T235241Z
47.666512,-122.098432,20.63,20161017T235342Z
47.666497,-122.098417,20.33,20161017T235443Z
47.666512,-122.098470,20.33,20161017T235548Z
47.666507,-122.098490,20.57,20161017T235644Z
47.666533,-122.098453,20.33,20161017T235832Z
47.666575,-122.098445,20.33,20161018T000042Z
47.666585,-122.098460,20.21,20161018T000236Z
47.666417,-122.098443,18.32,20161018T000337Z
47.666417,-122.098443,15.27,20161018T000438Z
47.666433,-122.098473,12.68,20161018T000538Z
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
47.666388,-122.098182,20.42,20161018T001046Z
```

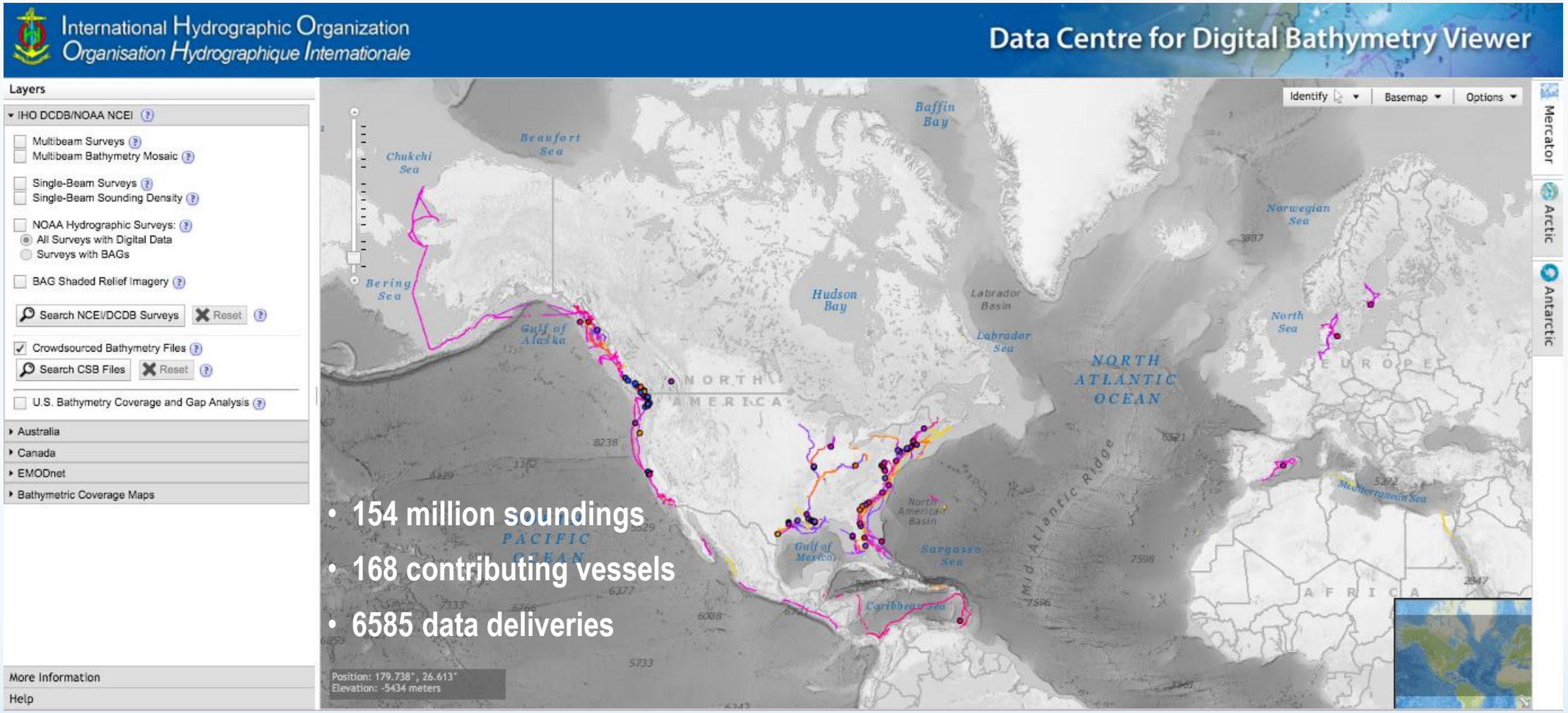
Frequent update of viewer

Data and identifying token are submitted to DCDB via HTTP post

IHO DCDB CSB Pipeline

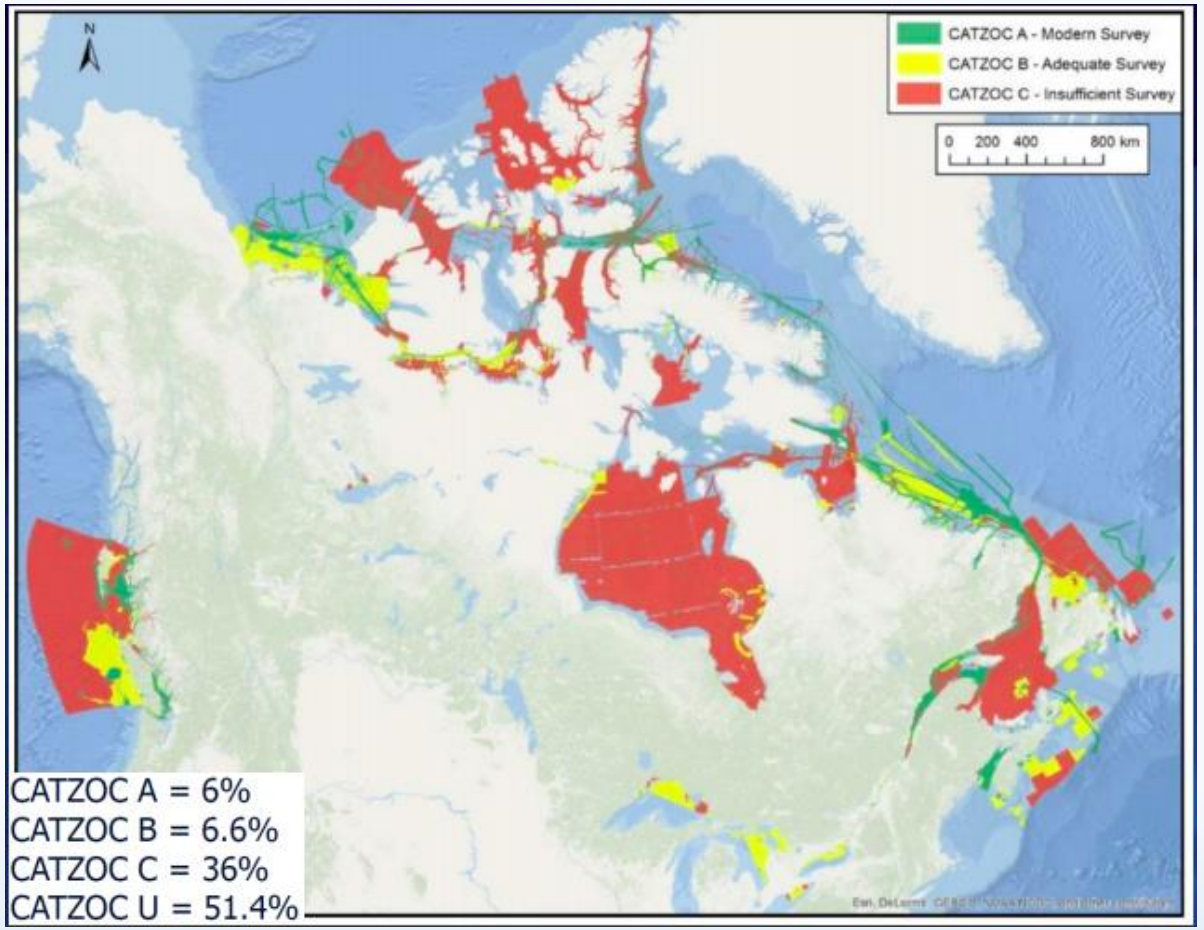


IHO DCDB CSB Data Holdings



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***

FAR SOUNDER

A WHOLE NEW VISION UNDERWATER

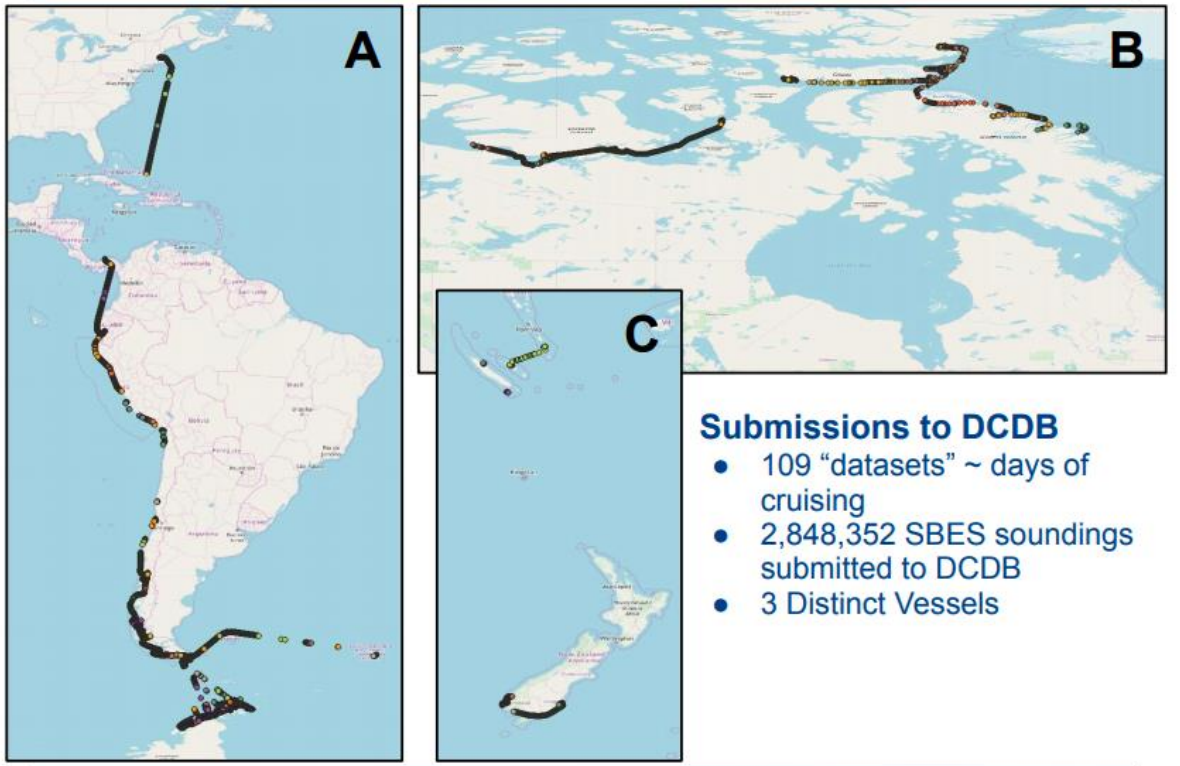
Update on FarSounder CSB Activities

IHO/NOAA CSBWG8
October 2019

Presenter: *Heath Henley*
Special thanks to *Austin Berard* - figures and analysis

FarSounder, Inc. www.farsounder.com 2019 Company Proprietary

Overview of Data Submitted



Submissions to DCDB

- 109 "datasets" ~ days of cruising
- 2,848,352 SBES soundings submitted to DCDB
- 3 Distinct Vessels

FarSounder, Inc. www.farsounder.com 2019 Company Proprietary

CSB Data Flow (in a perfect world)

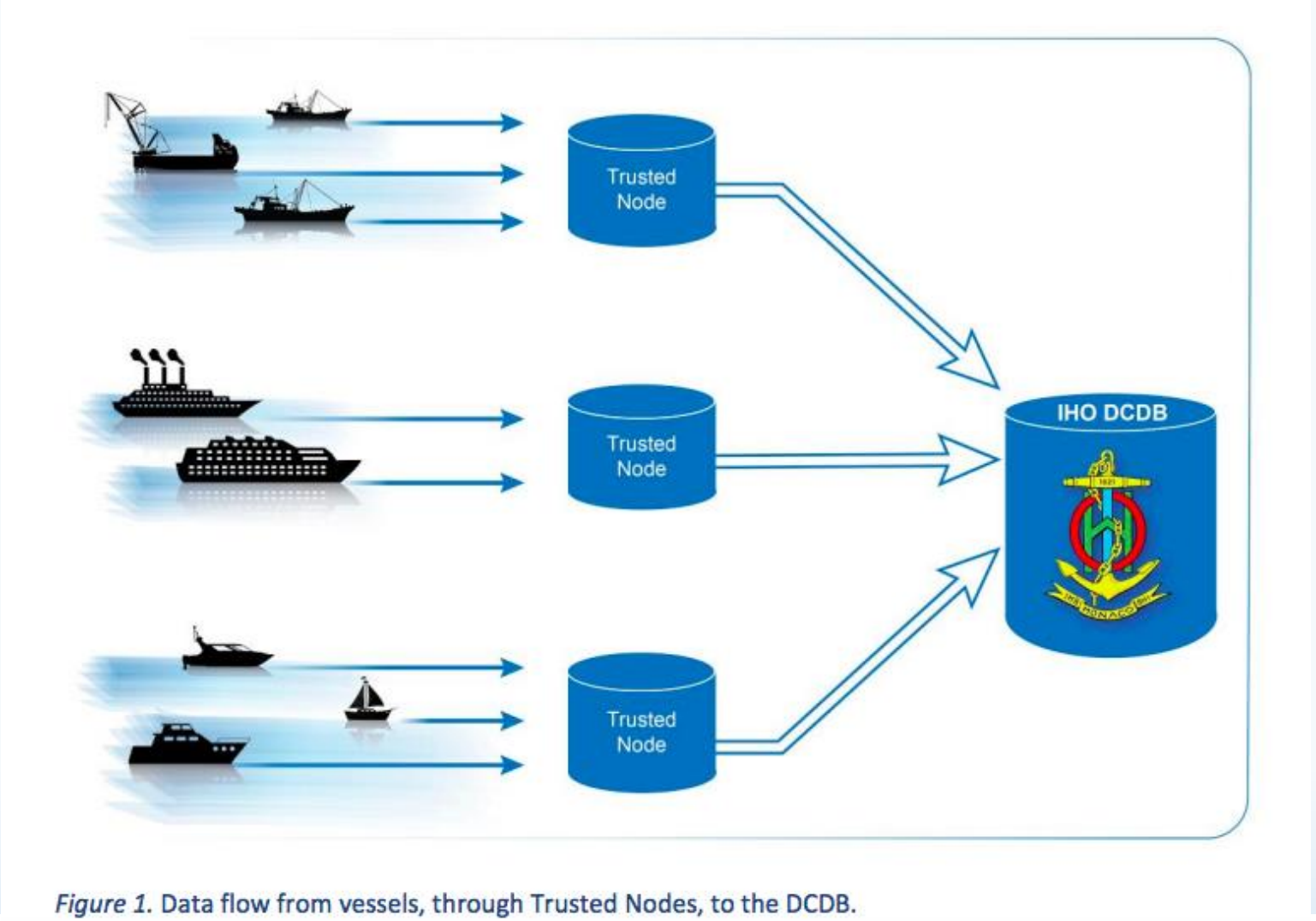
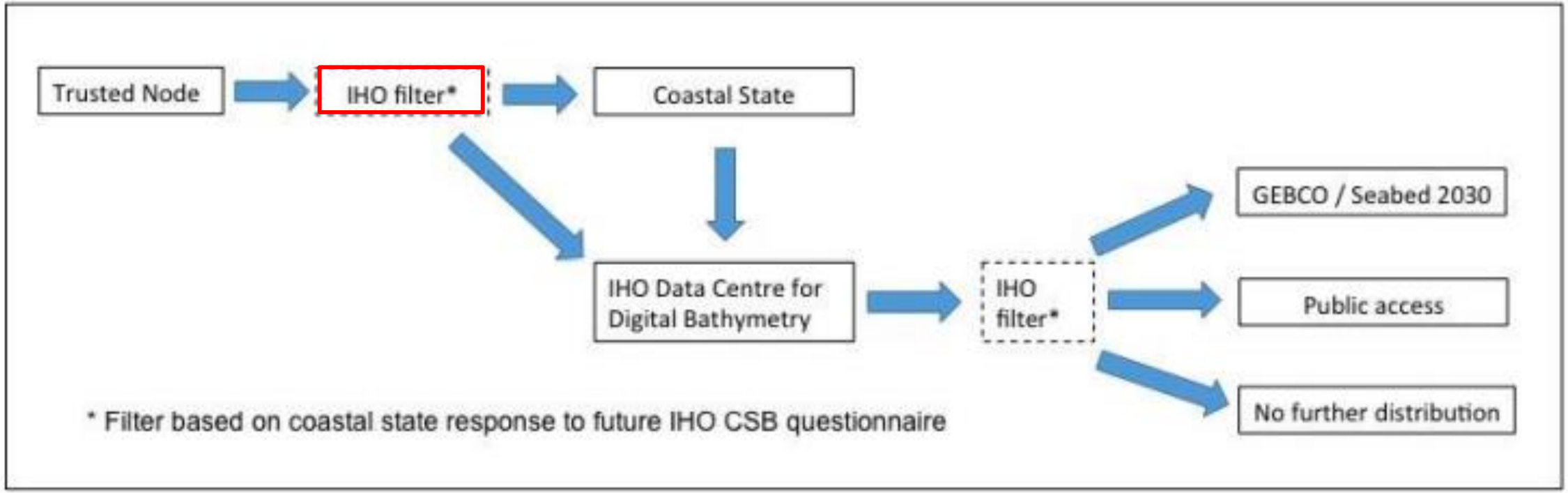


Figure 1. Data flow from vessels, through Trusted Nodes, to the DCDB.

CSB Data Flow (in today's world)



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

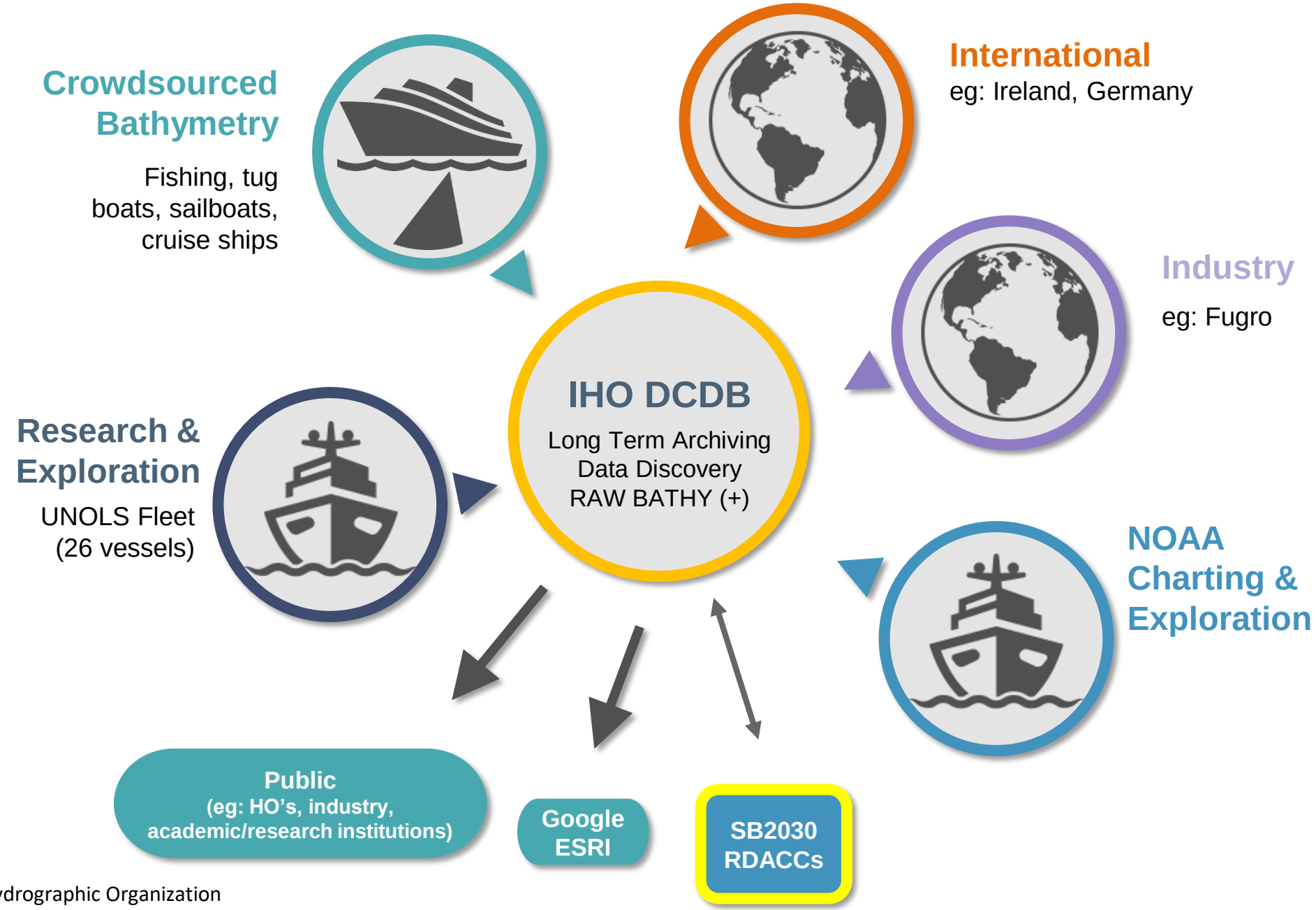
- Based on the results of IHO Circular Letter 11, described in CL 47, the DCDB will filter out CSB data collected from the waters of **all coastal countries not included on the positive list of 13***. This includes:
  - Countries we know are pro-CSB but haven't replied
  - Non-IHO member states
- Since 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*

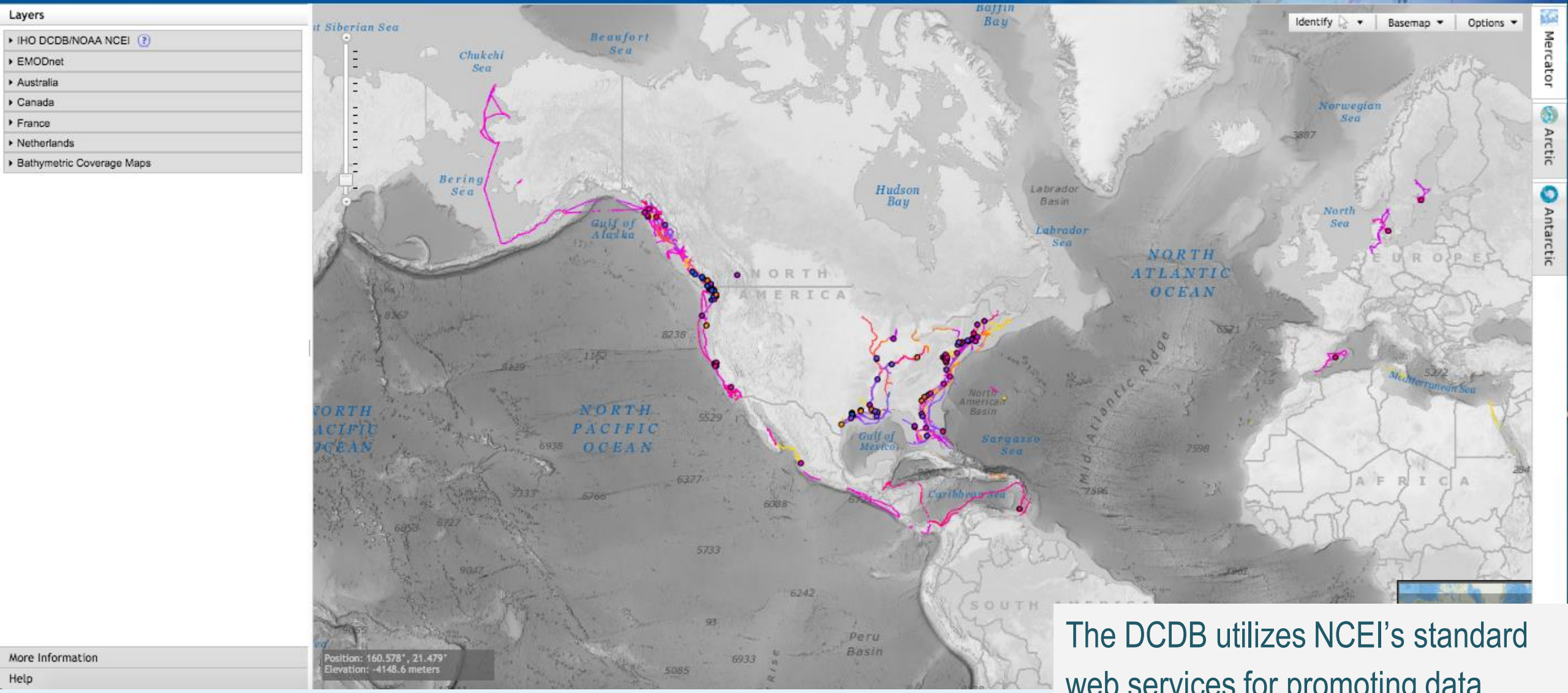
Summary analysis of positive responses

1. Based on the comments received to the questionnaire in Annex B to IHO CL 11/2019, the following table will be published as the Positive List to guide potential data gathering activities undertaken by the wider maritime community in waters of national jurisdiction:

Member State	Area	Specific actions required
Argentina	EEZ only	Provide copy of dataset to Hydrographic Office
Brazil	EEZ only	Provide copy of dataset to Hydrographic Office
Cyprus	All waters	Provide copy of dataset to Hydrographic Office
Denmark	All waters	Inform Hydrographic Office of any variance with published chart
Georgia	All waters	Provide copy of dataset to Hydrographic Office
Germany	All waters	Inform Hydrographic Office of new dataset
Monaco	All waters	Provide copy of dataset to Hydrographic Office
Netherlands	All waters	Inform Hydrographic Office of new dataset
New Zealand	All waters	Inform Hydrographic Office of new dataset
Norway	All waters – no multibeam activity without prior permission	Inform Hydrographic Office of new dataset
Philippines	Shipping routes and transit passages only	None
South Africa	EEZ only	Provide copy of dataset to Hydrographic Office
Sweden	EEZ only	Inform Hydrographic Office of new dataset
USA	All waters	None


Crowdsourced Bathymetry
Fishing, tug boats, sailboats, cruise ships
International
eg: Ireland, Germany
Industry
eg: Fugro
IHO DCDB
Long Term Archiving
Data Discovery
RAW BATHY (+)
Research & Exploration
UNOLS Fleet (26 vessels)
NOAA Charting & Exploration
Public
(eg: HO's, industry, academic/research institutions)
Google ESRI
SB2030 RDACCs

Data Centre for Digital Bathymetry Viewer



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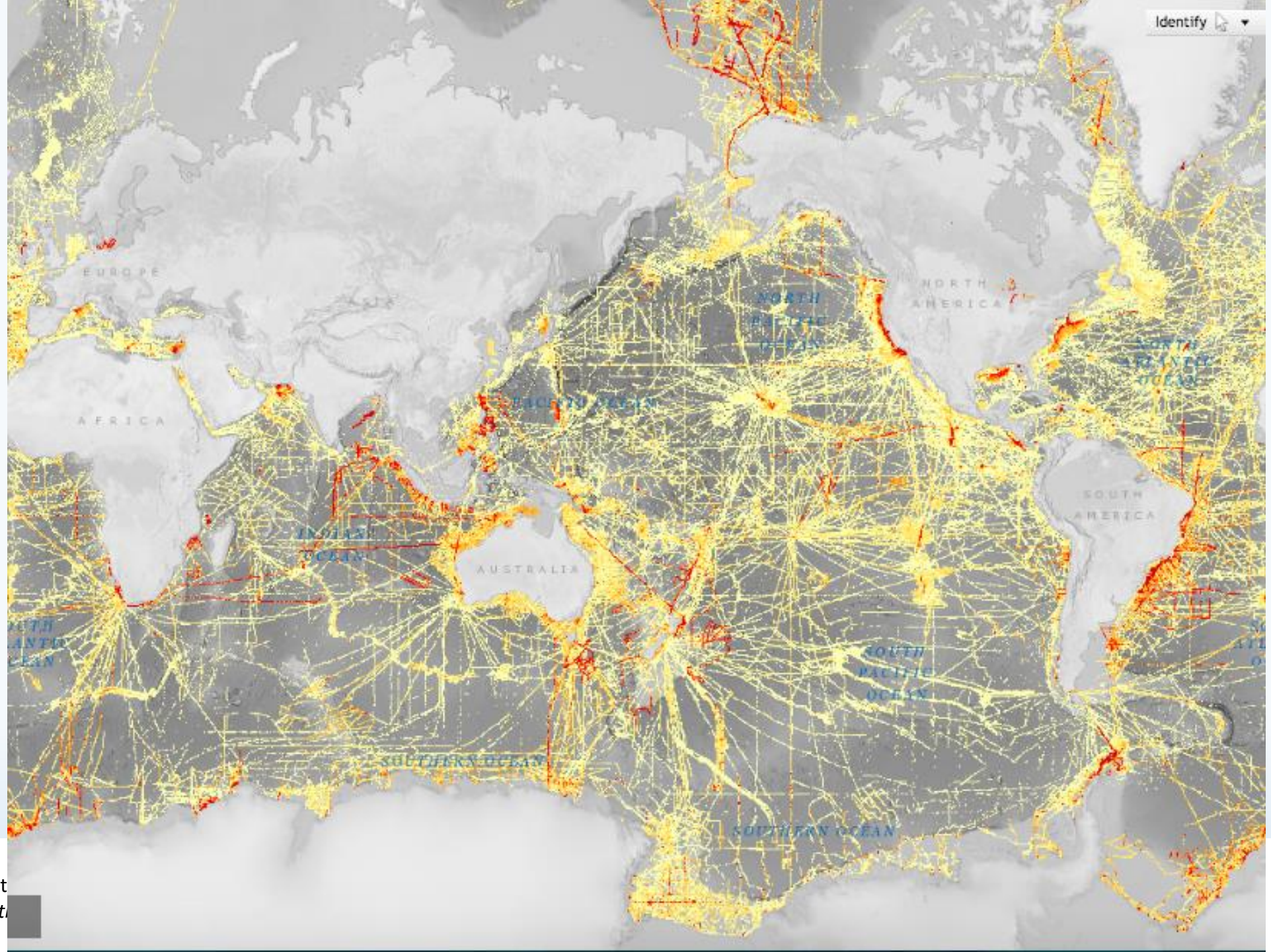
https://maps.ngdc.noaa.gov/viewers/iho_dcdb/



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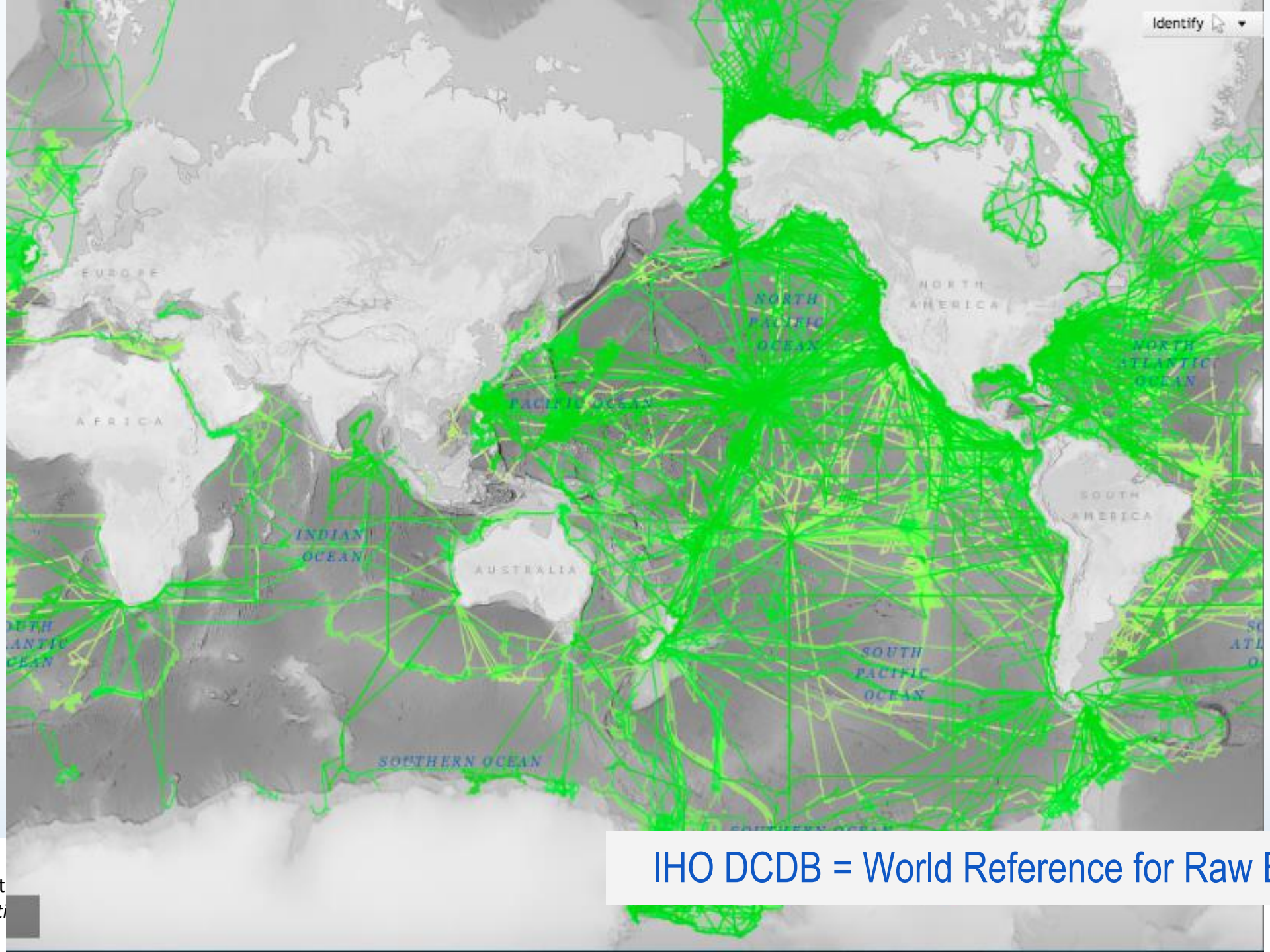

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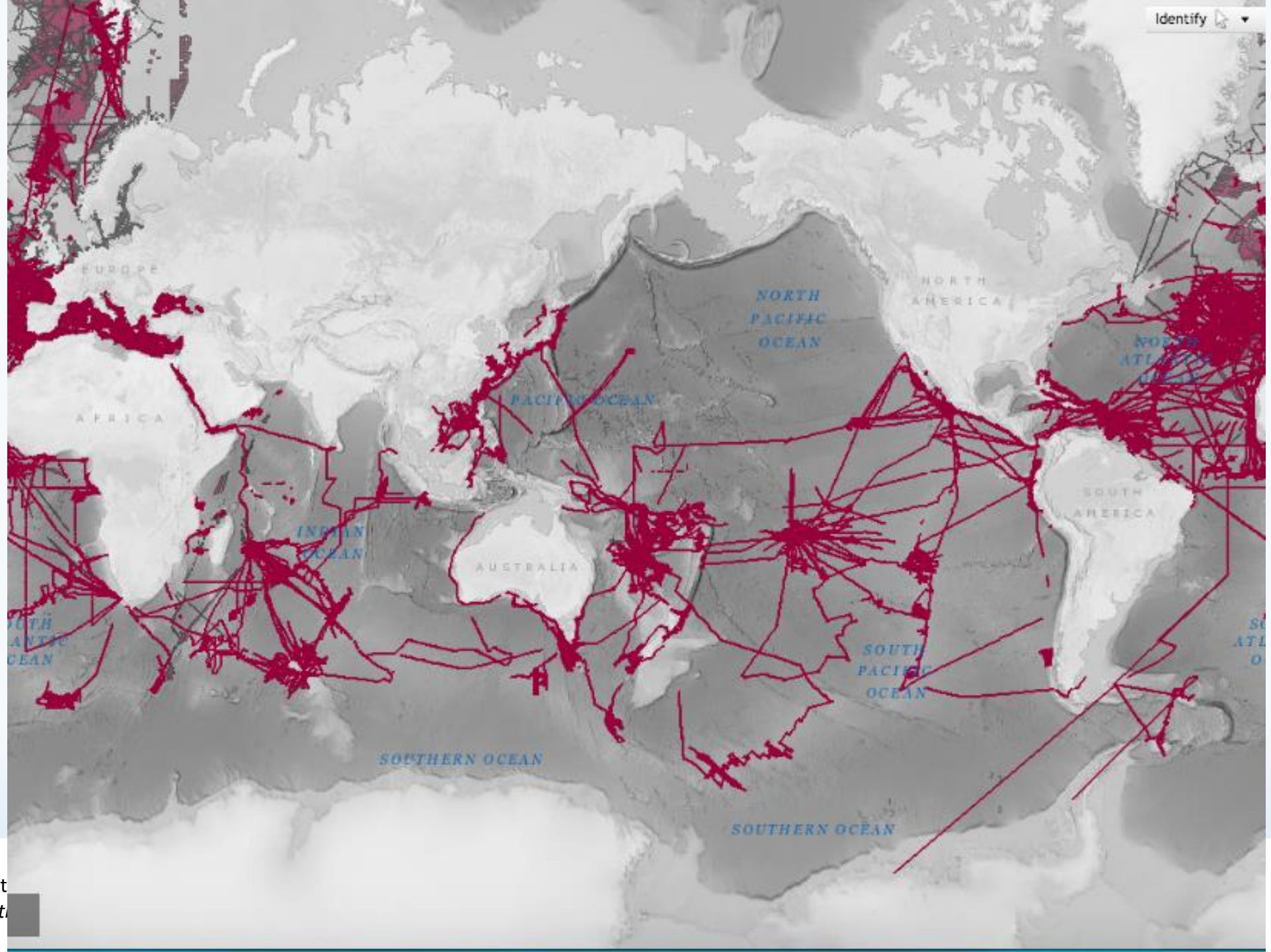
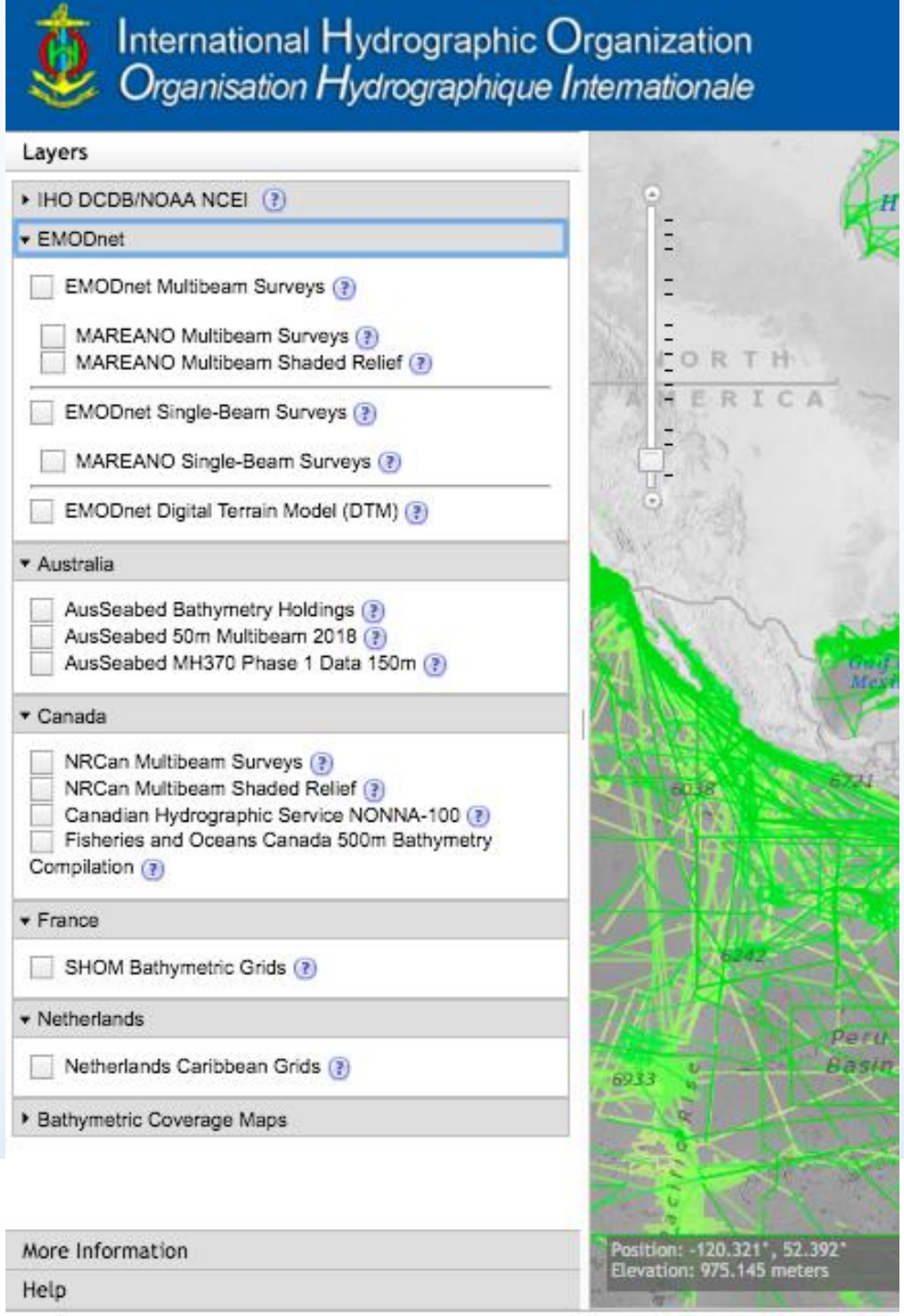
Organisati

IHO DCDB = World Reference for Raw Bathymetry


Identify
EUROPE
AFRICA
NORTH PACIFIC OCEAN
NORTH AMERICA
PACIFIC OCEAN
INDIAN OCEAN
AUSTRALIA
SOUTH AMERICA
SOUTH PACIFIC OCEAN
SOUTHERN OCEAN
SOUTHERN OCEAN


International Hydrographic Organization
Organisation Hydrographique Internationale
Layers
IHO DCDB/NOAA NCEI
EMODnet
EMODnet Multibeam Surveys
MAREANO Multibeam Surveys
MAREANO Multibeam Shaded Relief
EMODnet Single-Beam Surveys
MAREANO Single-Beam Surveys
EMODnet Digital Terrain Model (DTM)
Australia
AusSeabed Bathymetry Holdings
AusSeabed 50m Multibeam 2018
AusSeabed MH370 Phase 1 Data 150m
Canada
NRCan Multibeam Surveys
NRCan Multibeam Shaded Relief
Canadian Hydrographic Service NONNA-100
Fisheries and Oceans Canada 500m Bathymetry Compilation
France
SHOM Bathymetric Grids
Netherlands
Netherlands Caribbean Grids
Bathymetric Coverage Maps
More Information
Help
NORTH AMERICA
6038
6221
6242
6933
Peru Basin
Position: -120.321°, 52.392°
Elevation: 975.145 meters

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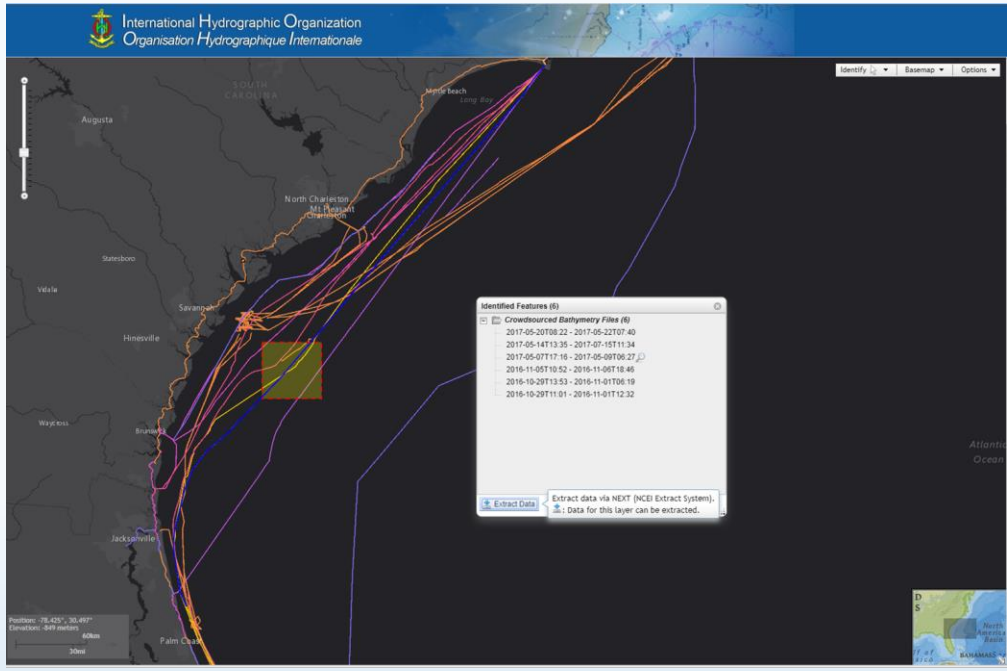
Next Steps

- 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.

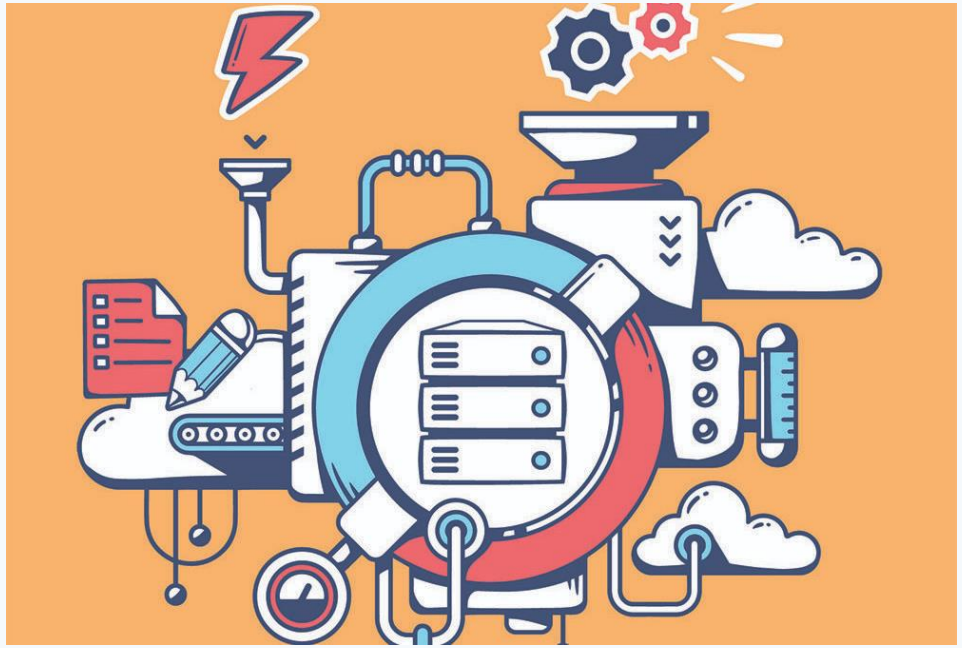
VISION

- 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 in to 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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