Crowdsourced Bathymetry Data via Electronic Charting Systems

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Co-located with the IHO Data Center for Digital Bathymetry
Bathymetry is a prerequisite for understanding how global earth systems interact.

- Influences the flow of sea water carrying heat, salt, nutrients, and pollutants
- Influences the propagation of energy from undersea seismic events
- Impacts navigation and commerce
- Defines habitats for sea life
Current multibeam bathymetry holdings in the IHO Data Center for Digital Bathymetry (DCDB)

It is estimated that only 15% of the global ocean floor has been mapped.
How Crowdsourcing Helps

• GEBCO Seabed 2030 – global initiative to map the oceans will rely heavily on crowdsourced data

• Enables all mariners to help map the gaps
How Crowdsourcing Helps

Hydrographic agencies worldwide are focusing on crowdsourced data as a viable and inexpensive source of data:

- Planning
- Reconnaissance
- Chart adequacy
- Ground truthing
The **IHO DCDB** is the recognized IHO repository for all deep ocean bathymetric data (greater than 100 m) collected by hydrographic, oceanographic and other vessels.

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

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**www.ngdc.noaa.gov/ihodc**
The IHO and NOAA have initiated a collaborative project to improve the DCDB through the collection of crowdsourced bathymetry (CSB) data.

The project goal is to enhance the IHO DCDB infrastructure and interface to ultimately allow the public to upload, discover, display and download bathymetric data via a web-based interface.

The IHO has also established the Crowdsourced Bathymetry Working Group – an international group tasked with developing a guidance document to establish best practices for the collection and submission of CSB data.
Electronic Charting Systems

- GIS exclusively for electronic nautical charts
- Commonly found on many vessels
- Basic needs:
  - Charts
  - Position (from GNSS)
- Additional data can be fed into system
  - Depth feed from echosounder (fish finder)

www.pcmaritime.com
Trusted Node Model
• NOAA and the DCDB have teamed with Rose Point Navigation Systems
• Mariners given option to participate
• Participants can be anonymous or choose to submit metadata about vessel and equipment
• A modified log file gets submitted via HTTP post that contains a JSON metadata string
Data formats

- XYZT from ECS
- JSON metadata string
- Converted to GeoJSON

```json
{
  "platform": {
    "uniqueID": "ROSEP-e8c669f8-df38-16e5-b86d-9a79686e9479",
    "type": "Ship",
    "name": "SS Dinghy",
    "length": 65,
    "lengthUnitOfMeasure": "meters",
    "IDType": "IMO",
    "IDNumber": "1088140"
  }
}
```
Project Flow

1. Trusted Node
2. POST
3. XYZT
4. geojson
5. www
6. web service
7. ingest process
8. geojson files
9. metadata catalog
10. spatial database
11. ETL

[Diagram showing the flow of data from trusted node to web service, then to ingest process, and finally to geojson files, metadata catalog, and spatial database with ETL process.]
Uses for Crowdsourced Bathymetry

How might these data benefit you?

NOAA’s Office of Coast Survey is using it for:

- Examining vessel traffic
- Determining Survey Priorities
- Determining Chart Adequacy

https://artes-apps.esa.int/
Steady Supply of Recent Data

- Provides a stream of recent data
- High traffic areas provide constant data
- Data can show when charted bathymetry becomes out of date
- Shows where traffic transit that may not have AIS (Automatic Identification System)
Shoaling Depiction

DEM created from Crowdsourced Bathymetry

DEM from charted depths

Same feature
Comparing with Charted Bathymetry

- Areas with shoaling can be easily identified
• Crowdsourcing is emerging as a viable and inexpensive way of acquiring bathymetric data for uses far beyond mapping
• CSB pilot project is proving successful at attaining its goal of easy, hands-free participation from mariners

Continued work
• IHO DCDB project is working toward download access
• Generate reporting – stats on contributions, downloads
• Scale up number of contributors/trusted nodes
Thank you

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Thank you to our partners:
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Sea ID
Professional Yachting Association
General Bathymetric Chart of the Oceans (GEBCO)