IHO DATA CENTRE FOR DIGITAL BATHYMETRY REPORT

Submitted by Director IHO DCDB

SUMMARY

Executive Summary: This document provides details of the work of the IHO DCDB, new/significant data contributors, an update on the ongoing development program to enhance the interfaces and data management capabilities of the DCDB as well as a general update on the work being undertaken by the CSBWG.

Action to be taken: See paragraph 7

Related documents: IHO CL23-1990 on Establishment of the DCDB;
2023 MOU between NOAA & the IHO To Cooperate on the Data Centre for Digital Bathymetry;
IHO CSB Guidance Document (B-12) Edition 3.0.0

1. Overview/Introduction

The IHO's Data Centre for Digital Bathymetry, which is hosted by NOAA, was established in 1990 to ensure that an international repository existed that would accept, manage, archive and share, freely and without restrictions, depth data contributed by hydrographic, oceanographic, and other vessels. The DCDB strongly encourages IHO Member States and other organizations to contribute their bathymetric data and metadata in a variety of standard formats and to work with DCDB data managers to determine the best way to get data to the repository. As the official repository for the IHO, the DCDB plays a pivotal role in the success of the IHO Crowdsourced Bathymetry Initiative and GEBCO.

2. Data Contributors

In the last year, the DCDB has archived over 1.7 TB uncompressed (1.08 TB compressed) of multibeam bathymetry data from 70 surveys and 5 sources. This includes:

- 40 surveys from 9 vessels contributed by Rolling Deck to Repository (R2R)
- 27 surveys from 4 vessels contributed by National Oceanic and Atmospheric Administration (NOAA); including 5 surveys from 1 vessel contributed by NOAA Ocean Exploration and Research (OE)
- 2 surveys from 1 vessel contributed by Inkfish
- 1 survey from 1 vessel contributed by the Maine Coastal Mapping Initiative (MCMI).

The DCDB continued to bring in crowdsourced bathymetry (CSB) data from Rosepoint Navigation System, FarSounder Inc, PGS, MacGregor Germany, M2Ocean, Great Lakes Observing System (GLOS), Orange Force Marine and GEC Aqua Map. New CSB data ingest pipelines were finalized with the Interdisciplinary Center for Development in Ocean Mapping (CIDCO), Seabed 2030,

International Seakeepers Society, and the Center for Ocean Mapping and Innovative Technologies (COMIT). We are currently in the process of onboarding Alcatel Submarine Network and Docktech.

36.2 GB of CSB data, contributed from 433 vessels, are publicly accessible. In April the DCDB exceeded 1 billion data points (1,226,019,281 as of October 2024).

3. IHO DCDB Enhancements

Multibeam Ingest Pipeline (MABLE)

Transition from current (outdated, inflexible) multibeam bathymetry database to new schema is 80% complete. The new schema will enable a better system for versioning of processed swath files, discovery of backscatter and ancillary files, efficient tracking of metadata for more complex datasets, and management of products associated with multiple surveys.

Completed build out of a new end-to-end multibeam archiving system. The system will feature increased automation (more efficient archiving times), improve error handling and notifications and include flexible options for future file readers and plugins. Enhancements will enable the ability to handle new multibeam data formats, new platforms (eg: uncrewed systems), processed data, and products.

The Crowdsourced Bathymetry Coastal State Review Application

Deployed to operational a new crowdsourced bathymetry pre-approval application. This app will allow coastal states to review data in areas of national jurisdiction when requested in IHO CL 01/2020 & IRCC CL 21/2020 responses. Over the next year, the DCDB will reach out to all coastal States who requested pre-approval of CSB data and provide them training and access to the CSB CSRA. The DCDB will seek and gather feedback and recommendations for future enhancements.

Crowdsourced Bathymetry Pipeline (Crowbar)

The DCDB receives most suggested enhancements for the CSB data pipeline (referred to as Crowbar), from the IHO Crowdsourced Bathymetry Working Group (CSBWG). Much of the current suggestions involve improving the discovery and access of CSB data through programmatic methods with our point cloud API.

The following requests were prioritized in Summer 2024, and work is currently ongoing:

- Increase searchability of cloud copies of CSB files, including filtering by date, provider, and geographic region. Add common queries to public documentation.
- Improve translation of files between ArcGIS MapService API and S3 bucket.
- Ensure full metadata is accessible alongside CSV in cloud buckets.
- Review options to improve efficiency of CSV files in cloud buckets.
- Ensure pipeline is compatible with GeoJSON schema updates.
- Add ability to create a custom URL for map viewers, allowing users to specify all files from a particular provider or platform within the URL.

DCDB Map Viewer

Once the contributed bathymetric data have been archived, they are made discoverable and accessible through the DCDB web map viewer (ncei.noaa.gov/maps/iho_dcdb/). Improvements and updates to the viewer over the last year include:

Updates:

- Simplified and revised AusSeabed and EMODnet layers
- AusSeabed: only footprints for bathymetry acquisitions and compilations are displayed.
- EMODnet: multibeam and singlebeam now combined; issue addressed with identify popup
- Updated UKHO web services
- Updated to ArcGIS jsapi 3.45

Additions:

- Cape Verde grids
- Seabed 2030 Regional Centers layer (under "Options")
- new ETOPO Hillshade basemap
- EMODnet and Germany layers (PANGAEA and AWI) to the Arctic and Antarctic views
- Canada layers (NRCan surveys/hillshades and NONNA-10/NONNA-100) to the Arctic view

In the next year, our intent is to finally modernize the DCDB Map Viewer. Motivation for this multi-month level of effort include: increasing maintainability, transitioning to a modern UI design, and increasing accessibility and 508 compliance.

GEBCO Gazetteer

The DCDB developed and hosts, on behalf of the IHO, the GEBCO Gazetteer, a web tool that allows the public to search for, view, and download information (eg: geographic location, feature dimensions, the discoverer, and the origin of the name) on more than 3800 undersea features. Gazetteer v4.3.7 is live at *ngdc.noaa.gov/gazetteer*. The GEBCO Subcommittee on Undersea Feature Names (SCUFN) is the primary stakeholder for the Gazetteer.

The DCDB software development team continues to make enhancements to Gazetteer 5 based on feedback from SCUFN members and internal testing. Since SCUFN 36 (November 2023), 17 enhancements and fixes have been made. This work included (1) resolving reported issues or enhancement requests, (2) providing maintenance releases and (3) continuing development on Gazetteer v5.0.4 which will provide interoperability with the Beta-Gazetteer developed by the Korean Hydrographic and Oceanographic Agency.

Continued improvements and enhancements of the Gazetteer will remain incremental and will focus next year on: Maintenance and upgrades (when necessary); Implementation of SCUFN-requested enhancements; Continued progress on the development of the GEBCO Gazetteer and KHOA OWS interoperation.

4. IHO CSB Working Group Update

In the last year, the number of positive IHO Member State respondents to CL21/2020 has risen to 36 with the addition of Kiribati and the UK. While momentum seems to be growing, there is still the need to consider how to work within the MSR constraints of UNLCLOS within waters under national jurisdiction.

Three working group meetings have been held since GGC40. A 3 hour intersessional meeting was held virtually on 13 December 2023; the 15th meeting (hybrid), from 23 – 25 April 2024, was hosted by the IHO Secretariat in Monaco and attended by ~80 participants (20 in person); a 3 hour intersessional meeting was recently held virtually on 15 October 2024. The meetings provided an opportunity to report on progress being made on each of the eleven work items detailed in the CSBWG work plan. Reports for these meetings can be found online: https://iho.int/en/csbwg.

An *IRCC Workshop on Crowdsourced Bathymetry* was organized and hosted by members of the CSBWG and the IHO Secretariat on 26 April 2024. National Hydrographers, or their Deputies, were strongly encouraged to participate and attend.

Workshop topics included:

- CSBWG Background, Workshop Purpose & Objectives, Current CSB data flow
- How CSB is supporting the UN Decade, GEBCO and the IHO Strategic Plan.
- Legal Considerations & Misconceptions
- Utility of CSB (The NOAA Example)
- Implementation of CSB in waters of national jurisdiction: the FRANCE case.
- CSB and the world of Yachting: the experience of the Yacht Club de Monaco (YCM)

The workshop drew 107 participants from over 50 coastal States. The IHO and the CSBWG consider the workshop a success as there was very active engagement with over a dozen questions posed, time to provide adequate answers, and very positive feedback provided during the event and afterwards. Several member states have since reached out reiterating the value of this type of engagement and highlighting that previous modes of communications around the various aspects of CSB had not always been clear.

An IHO CSB Tools Workshop is currently being planned to precede CSBWG16, 24-25 March 2025, hosted by NIWA & LINZ, in Wellington, New Zealand. The workshop aims to showcase a variety of current and under-development tools that pertain to all steps of the CSB data cycle, are available to the public, and are intended to advance the IHO Crowdsourced Bathymetry Initiative. Developers would provide assistance with first attempts to use these tools while also gathering user feedback. All interested CSB data collectors and users are encouraged to participate and attend.

5. DCDB & Seabed 2030 Coordination

The DCDB Director meets monthly with the Seabed 2030 Director and Administrator. These meetings allow for communication and coordination on several ongoing Seabed 2030-funded CSB activities. Through partnership with and funding by the NF-GEBCO Seabed 2030 Project, data loggers have been purchased and distributed to numerous CSB projects. The intent is for this to be a great way to

(1) collect data in underserved areas, (2) grow excitement about the CSB initiative, (3) develop a repeatable regional CSB mapping project strategy.

The DCDB Director also meets monthly with the Head of the Seabed 2030 Global Data Center. A primary goal of these discussions is to progress *Action 16 (GGC40)" SB2030 data centre to 1) provide an inventory 2) provide data to DCDB*.

6. Any Other Items of Note

N/A

7. Actions

The GGC is requested to:

a. **Note** the contents of this report;
b. **Take** any other action deemed appropriate.