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 and relevant activities of the AORA.

Action to be taken: See paragraph 8

Related documents: IRCC12-08A.2

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 both the IHO Crowdsourced Bathymetry and AORA's Atlantic Seabed Mapping International Working Group initiatives. As such, representatives of the DCDB serve as members of both working groups.

1. Data Contributors

The largest data providers to the DCDB continue to be the U.S. Academic Research Fleet (ARF) and the NOAA fleet with 140 and 21 surveys, respectively, archived in 2020.

Additional significant data contributions to the DCDB in 2020 include:

- Fugro - 35 surveys
- IFREMER – 1 survey
- GEOMAR – 2 surveys
- Federal Maritime and Hydrographic Agency of Germany (BSH) – 13 surveys
- Netherlands Institute for Sea Research (NIOZ) – 8 surveys

Notable data submissions received but not yet archived include:

- Five Deeps Expedition - 73 surveys
- Ocean Exploration Trust (OET) – 19 surveys
- AUV Sentry data – 1 survey/10 dives
- NOAA Data Rescue Project – 6 surveys from NOAA Ship *Nancy Foster*

Over the last year, the DCDB worked with FarSounder Inc, MacGregor Germany, James Cook University and PGS in establishing data submission pipelines for crowdsourced bathymetry data.

2. IHO DCDB Enhancements

CSB-related Enhancements:

In response to the IHO CSB initiative (2014), the DCDB commenced a program to enhance its infrastructure and interface to provide data ingest, archiving, discovery, display and retrieval of global CSB data contributed from mariners around the world. As the CSB initiative grows, the DCDB is working to develop beyond its current basic file management capabilities to a continuous point store hosted in the cloud. Moving to the cloud will allow for CSB data (and theoretically all bathymetric data sources) to be stored as a seamless collection of points. It is anticipated that the DCDB could then provide a variety of enhanced services along with the data itself, such as the ability for users to generate bathymetric grids of a given area using user-specified resolution, to retrieve data density information, and better support the guiding of future data collection efforts. In addition to the above developments, the DCDB plans to work with Member States to archive and make publicly available shallow water bathymetry extracted by Member States from their ENC Usage Bands 2 and 3 coverage.

Geographic Filter

Last year, the DCDB implemented a geographic filter for all incoming CSB data taking into account Member States positions on the collection of CSB data in a country's area of jurisdiction. The result is that data from only 13 CSB-supporting countries are currently discoverable and accessible via the DCDB Viewer. However, since the release of the updated IHO Circular Letter 21/2020 and IRCC Circular Letter 1/2020, which changed the focus of the request from whether or not a nation allows "CSB activity" to whether they allow "CSB data provision into the public domain", an additional 16 countries have responded positively. The DCDB plans to update the filter with these countries in 2021.

Improved Map Viewer:

Once the contributed bathymetric data have been archived, they are made discoverable and accessible through the DCDB web map viewer (maps.ngdc.noaa.gov/viewers/iho_dcdb/).

Improvements to the viewer over the last year include:

- Added new multibeam bathymetric survey footprints layer made up of simplified polygons produced using the Multibeam Bathymetry Mosaic.
- Added "Japan" as the newest web services contributor.
    - Tracklines of multibeam bathymetric surveys from JAMSTEC DARWIN (Data and Sample Research System for Whole Cruise Information)

are now discoverable.
- Added "Known Non-Public Data" layer which includes:
    - UNCLOS Coverage: the extent of coverage of data collected to support an extended continental shelf claim under Article 76 of the United Nations Convention of the Law of the Sea (UNCLOS).
    - Industry: Polygons and lines identifying known existing data that are not yet in the public domain. These data have been acquired, but are not owned, by Fugro and PGS. Included are web layers of PGS coverage and a web service displaying seep exploration polygons from Fugro.
- Added two new layers from the Canadian Hydrographic Service: Non-Navigational (NONNA) bathymetric products NONNA-10 and NONNA-100 at approximately 10 and 100-meter resolution respectively.
- Added several new and updated AusSeabed compilations layers (Australia).
- Added SevenCs WMS ChartServer as a basemap overlay option (Top right - Options).
- Added new GEBCO_2020 Type Identifier (TID) grid (Bathymetric Coverage Maps).
- The GMRT coverage map was automatically updated with the release of GMRT v3.8.

Planned DCDB Enhancements:

Over the next year, additional enhancements will focus on:

- Adding link on DCDB Homepage to the *How to Contribute Data to GEBCO* webpage
    - gebco.net/about_us/contributing_data/
- Migrating the current (outdated, inflexible) database to a new schema to enable a better system for:
    - Versioning of processed swath files
    - Discovery of backscatter and ancillary files
    - Indicating polygons of extent of coverage
- Redesigning multibeam ingest pipeline with a focus on automation and flexibility.
- Adding more trusted data providers in the CSB project.
- Implementing point storage technology (ie: cloud) to better handle the large volumes of points that are expected to be received.
- Enhancing the current data ingest pipeline to accept ENC point data.
- Improving the granularity and precision of the CSB geographic mask.
    - Will involve masking only the subset of a given submission which intersects with restricted areas.
    - May also include ability to take different actions with the embargoed data depending on the member state's requirements.

3. IHO CSB Working Group Update

CSBWG9

Due to the challenges that accompany a virtually held meeting, the scope of CSBWG9 (30 Jun - 02 Jul) was vastly reduced, the attendance was large (40+). The three-day (3 hours/day) meeting focused on: Current DCDB Work and IHO Projects, Current CSB Efforts, Messaging and Coordination, CSB Guidance and Outreach. Highlights from each session are captured below.

Current DCDB Work and IHO Projects

The Chair provided an update on developments to the IHO DCDB, including improved CSB data upload and download capabilities, the addition of MacGregor/Carnival Cruise Lines and FarSounder as the latest data contributors, and the implementation of a geographic filter for incoming data to take into account the positions of coastal states on the collection of CSB in their areas of jurisdiction.

Current CSB Efforts

Summaries of on-going CBS efforts and projects were provided to the WG prior to the meeting and are available on the CSBWG9 web page. Projects discussed include: Navico C-Map, CIDCO, FarSounder, JAMSTEC, TeamSurv, and The Great Barrier Reef Project.

Messaging and Coordination

The main purpose of this section was to focus on how the CSBWG can improve the engagement and leverage of other organizations already active in their outreach. Harmonization and coordination between the IHO, IOC, CSBWG, GEBCO and Seabed 2030 and the need for close cooperation to avoid duplication of effort was discussed. Representatives from GEBCO, Seabed 2030, the World Ocean Council and the IHO Data Quality Working Group were in attendance to discuss synergies between the groups.

"Outreach to Regional Hydrographic Commissions (RHCs)" was its own agenda item. The revised IHO CL and new IRCC letters to RHCs to obtain support for the provision of CSB data into the public domain were discussed. Specifically pointing out that the new letters now recognise that CSB is being collected, even if currently all data is not being made available. The Vice-Chair proposed a submission to IRCC requesting the inclusion of CSB activity in RHCs meetings and National reports and suggesting that the CSB/Seabed 2030 Regional Coordinators should be participating members of the CSBWG, see IRCC12-08A.2; this proposal was endorsed by the WG.

CSB Guidance and Outreach

The WG has agreed to generate sector-specific CSB Summary Guides over the next year aimed at the following sectors: Super yacht and leisure community, Survey, Geophysical and Submarine Cable industry, Fisheries, Cruise Line industry, Software/hardware industry, Hydrographic Offices, and the Academic/Scientific Research sector. Working group members and expert contributors were asked to volunteer for their sector of interest and knowledge. Concrete actions (upcoming virtual meetings, publications, etc) on how to address a selected group of sectors were also discussed.

CSB and the IHO Regional Hydrographic Commissions

As directed by CSBWG9 Actions, the Chair and Vice Chair of CSBWG drafted a formal letter (IRCC12-08A.2) to the IHO Inter-Regional Coordination Committee (IRCC) titled, "*CSBWG paper on raising the awareness of CSB within RHCs and proposed actions within RHCs to support the IHO CSB initiative."* The IRCC reacted positively and agreed to:

- Modify the current "RHC Seabed 2030 Coordinator" to a joint "RHC CSB/Seabed 2030 Coordinator." This person will serve as a member of the IHO CSBWG and as the point of contact to the relevant Seabed 2030 regional centers.
- Permanently add CSB and Seabed 2030 initiatives as an agenda item at future RHC meetings.

The result of the latter agreement led to the direct solicitation of coordinators by the CSBWG Chair. Responses from the RHC Chairs are listed below.

RHC	Country	Coordinator Name
NHC (Nordic)	Norway	Evert Flier
NSHC (North Sea)	Germany	Thomas Dehling
MBSHC (Mediterranean and Black Seas)	Italy	Marta Pratellesi
ARHC (Arctic)	Norway	Evert Flier
BSHC (Baltic Sea)	Denmark Sweden	Jens Peter Hartmann (CSB) Hans Öiås (SB2030)
USCHC	US	Capt. Andy Armstrong
EAHC (East Asia)	No response	
EAtHC (Eastern Atlantic)	Portugal	CDR João Vicente and Leonor Veiga
SEPRHC (South-East Pac)	No response	
SWPHC (South-West Pac)	To be discussed and decided at Feb. 2021 meeting.	
MACHC (Meso American & Caribbean Sea)	Mexico	Cecilia Cortina Guzman
SAIHC (Southern African and Islands)	To be discussed and decided at Feb. 2021 meeting.	
NIOHC (N. Indian Ocean)	India	CDR Rahul Bhatt
RSAHC (ROPME Sea Area)	No response	
SWAtHC (SW Atlantic)	No response	
HCA (HC on Antarctica)	Under discussion	

CSBWG10 & CSBWG11

A virtual CSBWG10 is scheduled for 16-18 March 2021. At this time the current invitation is from the IHO to host CSBWG11 in Monaco, 13-17 September 2021. It is proposed to hold the postponed second CSB Stakeholders Forum during the same period.

4. Seabed 2030-funded CSB Pilot Program Updates

Through partnership with and funding by the NF-GEBCO Seabed 2030 Project, a supply of generic data loggers were purchased and distributed to three regional CSB mapping projects as a proof of concept. The intent is for this to be a great way to (1) collect data in underserved areas, (2) grow excitement about the CSB initiative, and (3) develop a repeatable regional CSB mapping project strategy. Obviously, due to COVID-19, the speed in which the data loggers were ordered and distributed was greatly impacted and the roll out of these loggers to the communities is expected to also be severely delayed.

- The Institute for Marine Technology & the South African Navy Hydrographic Office:
    - 200 data loggers have finally arrived (supply chain delays due to sourcing components post COVID)
    - Testing to begin soon

    - Data receipt expected in mid 2021
- Palau:
    - Received 100 data loggers
    - Currently discussing community outreach strategy
- Greenland:
    - 30 loggers en route
    - Data collection will be done through on-ship engagement across Greenland (fishing vessels, transport vessels, small boats)

5. AORA Activities

The working group held its 11th meeting from 04 - 07 February 2020 in conjunction with the All-Atlantic Ocean Research Forum in Brussels, Belgium. 04 and 05 February were dedicated WG meeting days, and 06 and 07 February were in plenary sessions with the full Forum.

Updates were given by WG members on the larger AORA project, data management and sharing, several Atlantic mapping projects and transits, Seabed 2030, and communications activities. The WG reviewed a basic seafloor mapping plan, including time and cost estimates, for the North Atlantic area outside of national jurisdictions. This plan was developed by a sub-working-group formed at the 10th meeting. The plan was endorsed by the WG and presented to the full Forum.

Plans for the next meeting are on hold for now, as pandemic imposed constraints on at-sea work are limiting activities on which to report.

6. Actions

The GGC is requested to:

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