

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 7

Related documents: IRCC12-08A.2:CSBWG paper on raising the awareness of CSB within RHCs and proposed actions within RHCs to support the IHO CSB initiative

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, AORA activities, and GEBCO.

2. **Data Contributors**

The largest data providers to the DCDB continue to be the U.S. Academic Research Fleet (ARF) with 47 archived in 2021. Additional significant data contributions to the DCDB in 2021 include:

- NOAA - 17 surveys
- Fugro - 26 surveys
- US Geological Survey - 1 survey
- LDEO MGDS - 29 surveys (58 still in backlog)
- Caladan/Five Deeps - 73 surveys

Over the last year, the DCDB continued to bring in crowdsourced bathymetry data from Rosepoint Navigation System, FarSounder Inc, PGS and MacGregor Germany. New pipeline establishments are currently underway with Navico C-Map, M2Ocean, Great Lakes Observing System (GLOS), and Aquamap.

It is worth noting that the estimated seafloor mapped for the DCDB Archive holdings was calculated to be ~12%.

3. **IHO DCDB Enhancements**

Improved Map Viewer:

Once the contributed bathymetric data have been archived, they are made discoverable and accessible through the DCDB web map viewer.

Improvements and updates to the viewer over the last year include:

- New url: ncei.noaa.gov/maps/iho_dcdb/
- Web Services - Updates:
 - Added several new and updated AusSeabed compilations layers (Australia).
 - Point to new WMS endpoints for Netherlands Caribbean grids
 - Added new GEBCO_2021 Type Identifier (TID) grid (Bathymetric Coverage Maps).
- Web Services - New:
 - SAILDRONE Multibeam Coverage Polygons
 - Land Information New Zealand (LINZ) bathymetric data layers
 - UKHO Bathymetric Survey Coverage (view only)
 - IFREMER raw Multibeam layer (view only)
 - Alfred Wegener Institute processed multibeam data coverage
 - PANGEA processed and raw bathymetry data and footprints
 - Global Maritime Traffic Density Service
- “Grid Extract” added to the viewer:
 - Grid Extract is a web application which accepts the user’s area of interest, cell size, and grid format and then asynchronously produces a custom data grid (GeoTIFF) from either the "Multibeam Mosaic" or "Multibeam Mosaic Hillshade."

CSB-specific Enhancements:

Software developers at the DCDB spent several months in 2021 performing a major overhaul of the CSB data ingest-extract-archive pipeline. The work took into account the lessons learnt over the past few years with the intent to provide a better service, improved functionalities and an enhanced user experience. This new infrastructure will be deployed in summer, 2022.

As the CSB initiative grows, the DCDB has also been working to develop beyond its current basic file management capabilities to a continuous point store hosted in the cloud. The CSB data are currently available either through the [NOAA Big Data Program](#) or through the DCDB viewer. Moving to the cloud now allows for CSB data to be stored as a seamless collection of points. The end user can now query this point store to extract just the data of interest and request that a grid be created from the results.

Planned DCDB Enhancements:

Over the next year, additional enhancements will focus on:

- Finalizing the migration of the current (outdated, inflexible) database to the 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
- Deploying the new multibeam ingest pipeline which will result in improved automation and flexibility.
- Adding more trusted data providers in the CSB project.
- 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.
- Update [AutoGrid](#)
 - The current version of AutoGrid is a web application which accepts the user's area of interest, cell size, and grid format and then asynchronously produces a custom data grid from the multibeam archive.
 - AutoGrid 2.0 will run in the cloud (AWS) and include multibeam and CSB data (eventually singlebeam and possibly lidar).

4. IHO CSB Working Group Update

CSBWG10

The three day (3 hours/day) meeting focused on: Current DCDB Work and IHO Projects, Current CSB Efforts, Messaging and Outreach, and Improving our Outreach Strategy.

Current DCDB Work and IHO Projects

The Chair provided an update on developments to the IHO DCDB, including a major overhaul of the CSB pipeline that was currently underway, taking into account the lessons learnt over the past few years to provide a better service, improved functionalities and an enhanced user experience. She highlighted the current Trusted Nodes providing CSB data to the DCDB (Rosepoint Navigation Systems Software MacGregor/Carnival, FarSounder, PGS) and noted that significant quantities of data had been received from James Cook University (JCU) but that the data release is awaiting AHO approval. She highlighted the geographic data filter that had been developed to comply with the responses received to the IHO CLs.

Presentations on three related projects and their impact on the CSB Initiative were discussed in great detail: Nippon Foundation-GEBCO Seabed 2030 Project, Canadian Hydrographic Service (CHS) CSB activities, and An Open Hardware/Software Solution for Focused CSB Data Collection. Detailed summaries are available on the CSBWG10 web page.

Current CSB Efforts

Summaries of on-going CSB efforts and projects were provided to the WG prior to the meeting and are available on the CSBWG10 web page. Projects discussed include: DaGama Maritime, FarSounder Inc., Navico C-Map, CIDCO, James Cook University/The Great Barrier Reef Project, JAMSTEC, Canadian Hydrographic Service, Fugro and China MSA. Activities of the DQWG relevant to the CSBWG, in particular focusing on guidelines and recommendations for HOs to allocate CATZOC values, was also given by the DQWG Chair.

Messaging and Outreach

The main purpose of this section was to focus on how the CSBWG can improve the engagement to Regional Hydrographic Commissions (RHCs) and Hydrographic Offices. The Vice-Chair highlighted the successful request to IRCC12 for the identification of Regional Coordinators (see table below) and for the inclusion of CSB activities in national reports to RHC meetings.

CSB Guidance and Outreach

WG members presented sector-specific CSB Summary Guides that had been drafted during the intersessional period for 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.

SHOM provided brief details on proposed amendments identified during the French translation process of B-12. He noted the target audience and noted the reasons why the document should be improved, including correction of typos, update outdated information, improvement of figures, clarity

of target audience and more detail of some concepts. During the intersessional period, he requested suggested amendments from the WG.

CSBWG11

The main focus of CSBWG11 was to progress the effort of updating B-12: CSB Guidance on Crowdsourced Bathymetry. The meeting was split into two distinct components. The first was the B-12 Drafting Team review sessions, and associated plenary discussion sessions, and the rest of the agenda, all of which were heard during the second half plenary session. In order to provide a coherent record of the deliberations, the CSBWG11 report was split into two parts which reflect these distinct components.

B-12

The meeting commenced with an overview of why B-12 needed to be revised, highlighting the need to make it technology agnostic and more focused on the needs of the end user as principle drivers. The morning component of each day included review and discussion of each chapter of B-12 facilitated by the drafting team lead(s): Introduction, Data Contribution, Data Collection, Data & Metadata, Uncertainty/Data Quality and Additional Considerations. The afternoon components, again facilitated by the drafting team leads, included a brief summary of the morning session, review of the topics that achieved consensus, and then allowed for discussion that focused on issues where agreement had not been reached. The intent was for (1) the topics that reached consensus to be included in the next draft of B-12 and (2) the outstanding issues to be clarified. Chapter-focused intersessions would then be scheduled to progress these efforts before CSBWG12.

Current DCDB Work

USA provided an update on developments to the IHO Data Centre for Digital Bathymetry (DCDB), including a major overhaul of the CSB pipeline that was currently underway, taking into account the lessons learnt over the past few years to provide a better service, improved functionalities and an enhanced user experience. She highlighted the current Trusted Nodes providing CSB data to the DCDB (Rosepoint Navigation Systems Software MacGregor/Carnival, FarSounder, PGS) and noted that significant quantities of data had been received from James Cook University (JCU) but that the data release is awaiting AHO approval. She highlighted the geographic data filter that had been developed to comply with the responses received to the IHO CLs.

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 CSBWG11 web page. Projects discussed included: James Cook University/The Great Barrier Reef Project, SeaID, M2Ocean, Chartworld/SevenCs and GLOS.

Outreach to RHCs

The main purpose of this agenda item was to focus on how the CSBWG can improve the engagement to Regional Hydrographic Commissions (RHCs) and Hydrographic Offices. The IHO Sec gave a report on MS Data Gathering Policy activity and reported that no further MS had responded to the CL. It was suggested that at future meetings, the WG should explore what other mechanisms can be used to encourage more positive action as issuing more CLs asking the same questions are unlikely to generate greater support.

Cmdr Christoff Theunissen (Seabed 2030/CSB Coordinator for SAIHC) presented a summary of lessons learned and introduced their trial and partnership with the Institute of Maritime Technology (IMT). Updates were then provided by Coordinators from the following RHCs: USCHC, ARHC, SWPHC, NSHC, MACHC, and MBSHC.

General Outreach

The Chair presented the sector specific 2-pager CSB summary guides that had been finalized during the intersessional period. Approval was received from the WG. These 2 pagers can be accessed here: iho.int/en/communication-material. Distribution of these flyers to the public is strongly encouraged.

RHC	Country	Coordinator Name
NHC (Nordic)	Norway	Evert Flier
NSHC (North Sea)	Norway	Evert Flier
MBSHC (Mediterranean and Black Seas)	Lebanon	Afif Ghaiih
ARHC (Arctic)	Norway	Evert Flier
BSHC (Baltic Sea)	Sweden	Hans Öiås
USCHC	US	Capt. Andy Armstrong
EAHC (East Asia)	Japan	Kentaro Kaneda
EAtHC (Eastern Atlantic)	Portugal	LCDR Telmo Geraldes Dias
SEPRHC (South-East Pac)	No response	
SWPHC (South-West Pac)	N Zealand	Stuart Caie
MACHC (Meso American & Caribbean Sea)	Mexico	Cecilia Cortina Guzman
SAIHC (Southern African and Islands)	S Africa	CDR Christoff Theunissen
NIOHC (N. Indian Ocean)	India	CDR Rahul Bhatt
RSAHC (ROPME Sea Area)	No response	
SWAtHC (SW Atlantic)	Uruguay	CDR Niki Eugenio Silvera
HCA (HC on Antarctica)	Under discussion	

5. DCDB & Seabed 2030 Coordination

The DCDB Director meets monthly with both the Seabed 2030 Director and Development Coordinator. 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, a supply of generic 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. 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. However, the programs listed below are progressing:

- The Institute for Marine Technology & the South African Navy Hydrographic Office
- Greenland Institute of Natural Resources
- Palau Bureau of Marine Transportation
- Tall Ship Pelican of London
- Lisa Blair Sails the World
- Several activities organized by S&W Pacific Regional Center

6. AORA Activities

Members of the Atlantic Seabed Mapping International Working Group (ASMIWG) presented at the [All-Atlantic 2021 Conference Side Event](#) on 2 June 2021. The objective of the [Atlantic Seabed Mapping](#)

[and Exploration – Achievements, Challenges and Opportunities](#) session was to present achievements and lessons learned from the activities of the AORA ASMIWG and ASPIRE Initiatives and to discuss a path forward to increase information/challenges/opportunities for seabed mapping and ocean exploration in the North and South Atlantic and to contribute to Seabed 2030.

Individual and small group meetings and discussions between ASMIWG members are ongoing, including meetings between US, Ireland, Portugal, Brazil, UK, and Spain. Some ASMIWG members met in Lisbon on Nov 8th 2021 to exchange updates on seabed mapping activities and plans, to inform a H2020 Mission Atlantic Seabed Mapping Framework report, and assess the feasibility of holding an ASMIWG meeting in Ireland at the Dublin Castle Remote Hydrography International conference Feb 24-26th 2022. The in-person event proceeded however an ASMIWG meeting did not go ahead due to ongoing travel constraints.

7. Actions

The GGC is requested to:

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