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IHO International Hydrographic Organization

IHO CSBWG17 Tools Workshop
2-3 March 2026
Durham, New Hampshire, USA

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International Hydrographic Organization

IHO DCDB Trusted Nodes

ncei.noaa.gov/iho-data-centre-digital-bathymetry

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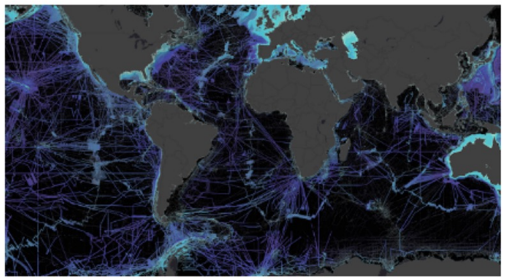
IHO Data Centre for Digital Bathymetry (DCDB)

The International Hydrographic Organization (IHO) Data Centre for Digital Bathymetry (DCDB) was established in 1990 to steward the global collection of bathymetric data. The Centre archives and shares, freely and without restrictions, depth data contributed by mariners and other stakeholders consistent with IHO direction and guidance. The IHO DCDB is hosted by the U.S. National Oceanic and Atmospheric Administration (NOAA) on behalf of the IHO Member States.

The DCDB archive includes over 70 terabytes (uncompressed) of oceanic depth soundings acquired with multibeam and single beam sonars by hydrographic, oceanographic and industry vessels during surveys or while on passage.



25% of the deep ocean floor has been mapped with direct measurement and approximately 50% of the world's coastal waters remain unsurveyed. (Source: GEBCO)

About Multi/Singlebeam Bathymetry Crowdsourced Bathymetry

CSB Data Flow Overview


```
{
    "crs": {
        "horizontal": {
            "type": "EPSG",
            "value": 4326
        },
        "vertical": "Transducer"
    },
    "providerContactPoint": {
        "orgName": "Example Cruises Inc",
        "email": "support@example.com",
        "logger": "Rose Point ECS",
        "loggerVersion": "1.0"
    },
    "convention": "XYZ CSB 3.0",
    "dataLicense": "CC0 1.0",
    "platform": {
        "uniqueID": "EXAMPLE-f8c469f8-df38-11e5-b86d-9a79f06e9478",
        "correctors": {
            "positionReferencePoint": "GNSS"
        }
    }
}
```


CSB data log file (with JSON metadata string)


```
LON, LAT, DEPTH, TIME
68.499214, 15.832683, 59.3, 2020-02-25T01:08:06Z
68.499151, 15.832738, 59.3, 2020-02-25T01:08:07Z
68.498965, 15.832905, 61.3, 2020-02-25T01:08:11Z
68.498965, 15.832905, 61.3, 2020-02-25T01:08:11Z
68.498655, 15.833184, 61.3, 2020-02-25T01:08:15Z
68.498592, 15.833239, 61.3, 2020-02-25T01:08:16Z
68.498213, 15.833567, 55.3, 2020-02-25T01:08:23Z
68.49815, 15.833622, 55.3, 2020-02-25T01:08:24Z
68.49815, 15.833622, 55.3, 2020-02-25T01:08:24Z
68.497713, 15.83401, 54.3, 2020-02-25T01:08:30Z
68.497399, 15.834287, 53.3, 2020-02-25T01:08:35Z
68.497399, 15.834287, 53.3, 2020-02-25T01:08:36Z
68.497336, 15.834341, 53.3, 2020-02-25T01:08:36Z
68.497147, 15.834506, 59.3, 2020-02-25T01:08:39Z
68.497147, 15.834506, 59.3, 2020-02-25T01:08:40Z
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68.496708, 15.83489, 54.3, 2020-02-25T01:08:47Z
68.496708, 15.83489, 54.3, 2020-02-25T01:08:47Z
68.496646, 15.834946, 54.3, 2020-02-25T01:08:48Z
68.496457, 15.835112, 49.3, 2020-02-25T01:08:50Z
68.496457, 15.835112, 49.3, 2020-02-25T01:08:51Z
68.496205, 15.835332, 53.3, 2020-02-25T01:08:55Z
68.496143, 15.835387, 53.3, 2020-02-25T01:08:55Z
```
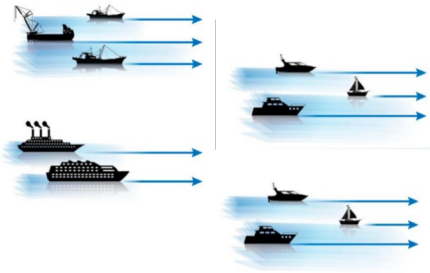
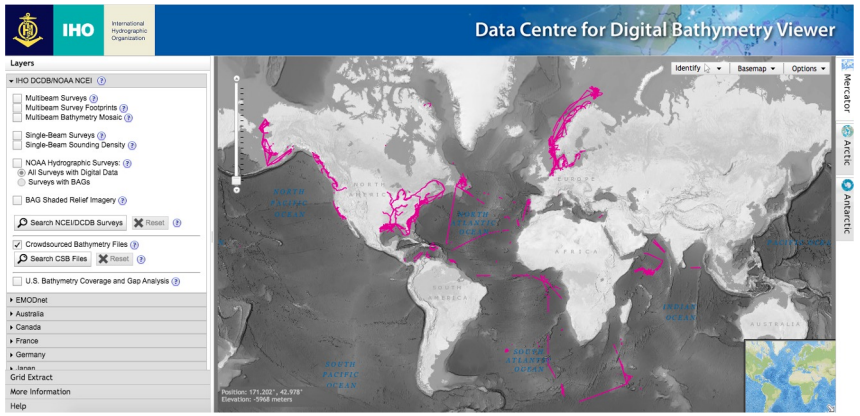




Data and identifying token are submitted to DCDB via HTTPS post

Data discovery and access via map viewer.



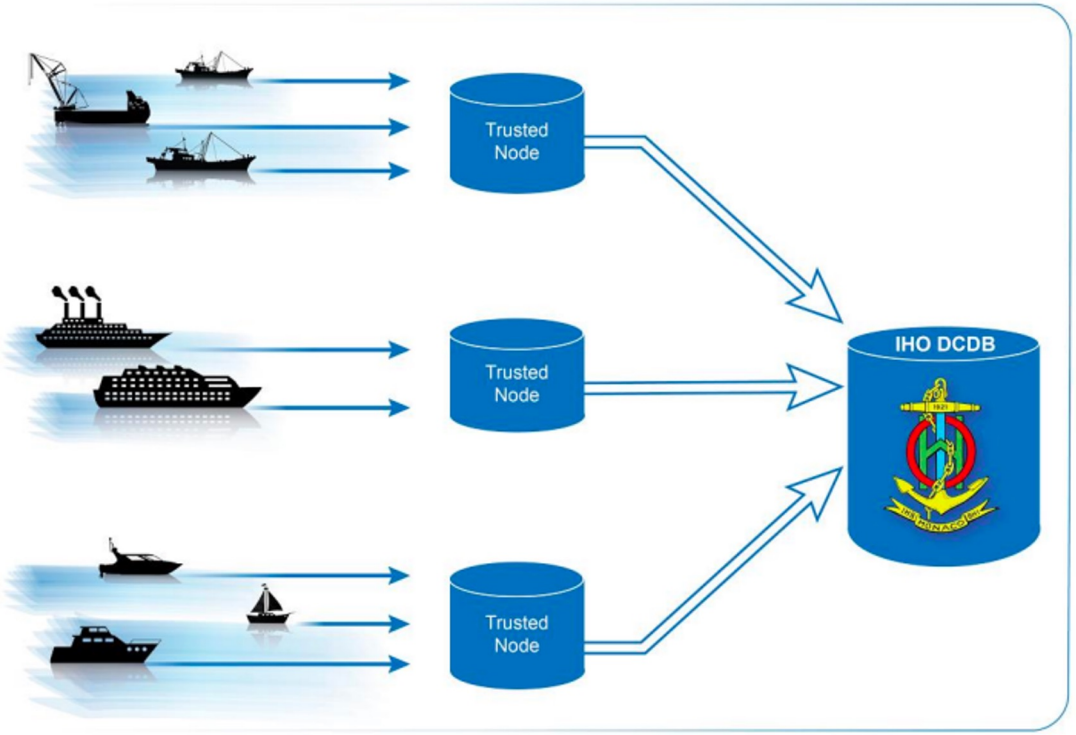
Frequent update of viewer

CSB Trusted Nodes

As the CSB program was being developed, it became clear that it would not be practical for the DCDB to interact with hundreds of individual mariners.

Instead, the idea of a **“trusted node”** became a central concept.

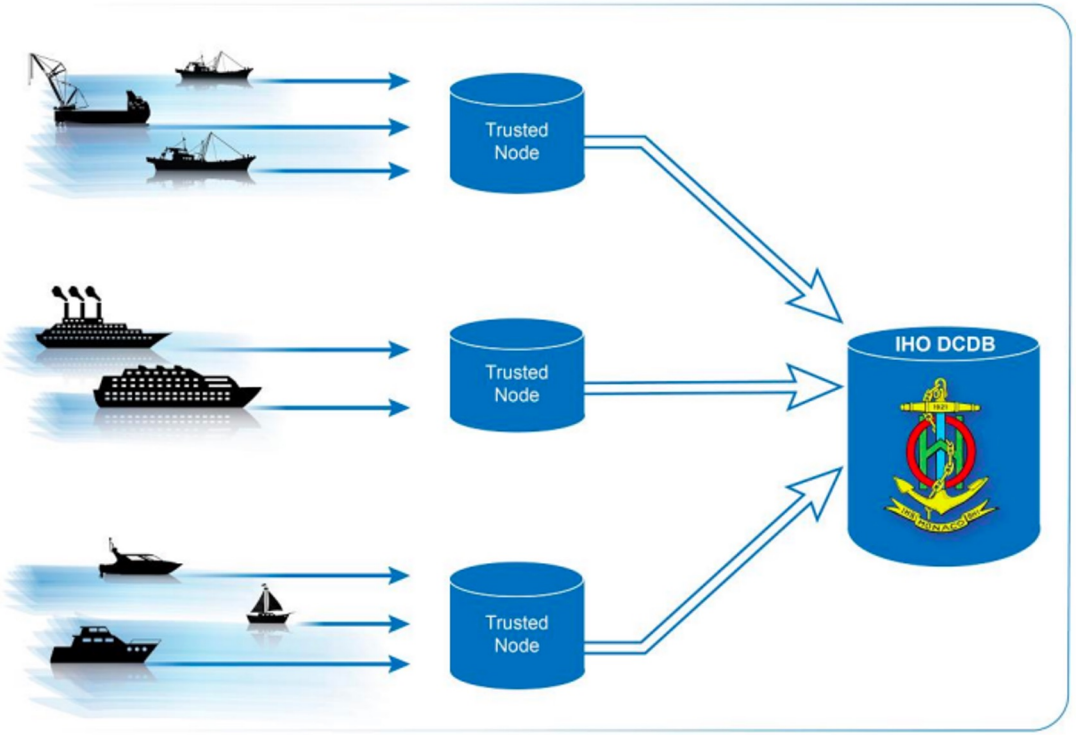
A **trusted node** is essentially a trusted data provider. It can be an academic organization, a nonprofit, a commercial company, a regional center, etc.



CSB Trusted Nodes

Trusted Nodes fill many roles - from providing data logging software or hardware solutions, to installing data loggers, offloading data, to community engagement and outreach.

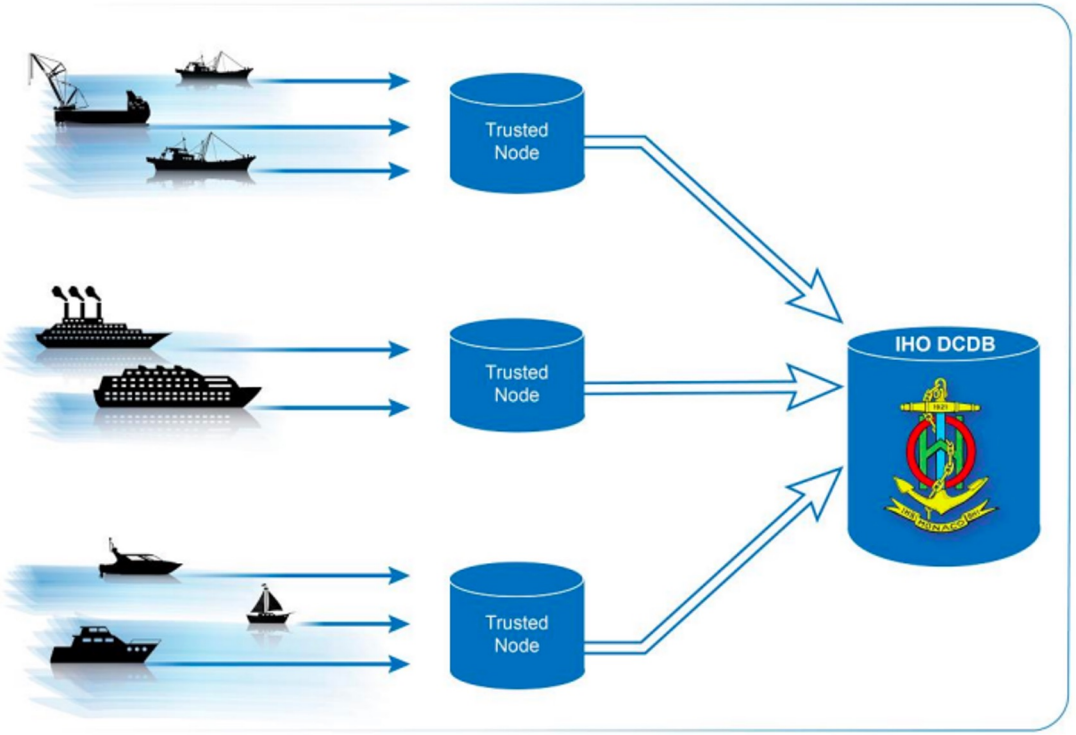
From the DCDB's perspective, the critical duty of a **trusted node** is securely transferring data from their community to the DCDB in B-12 compatible formats in accordance with our Guidance for Submitting CSB Files.



CSB Trusted Nodes

Trusted Nodes could reasonably be required to provide test files, sign submission agreements, and receive secure tokens once they have worked with DCDB to establish their role and contribution plan.

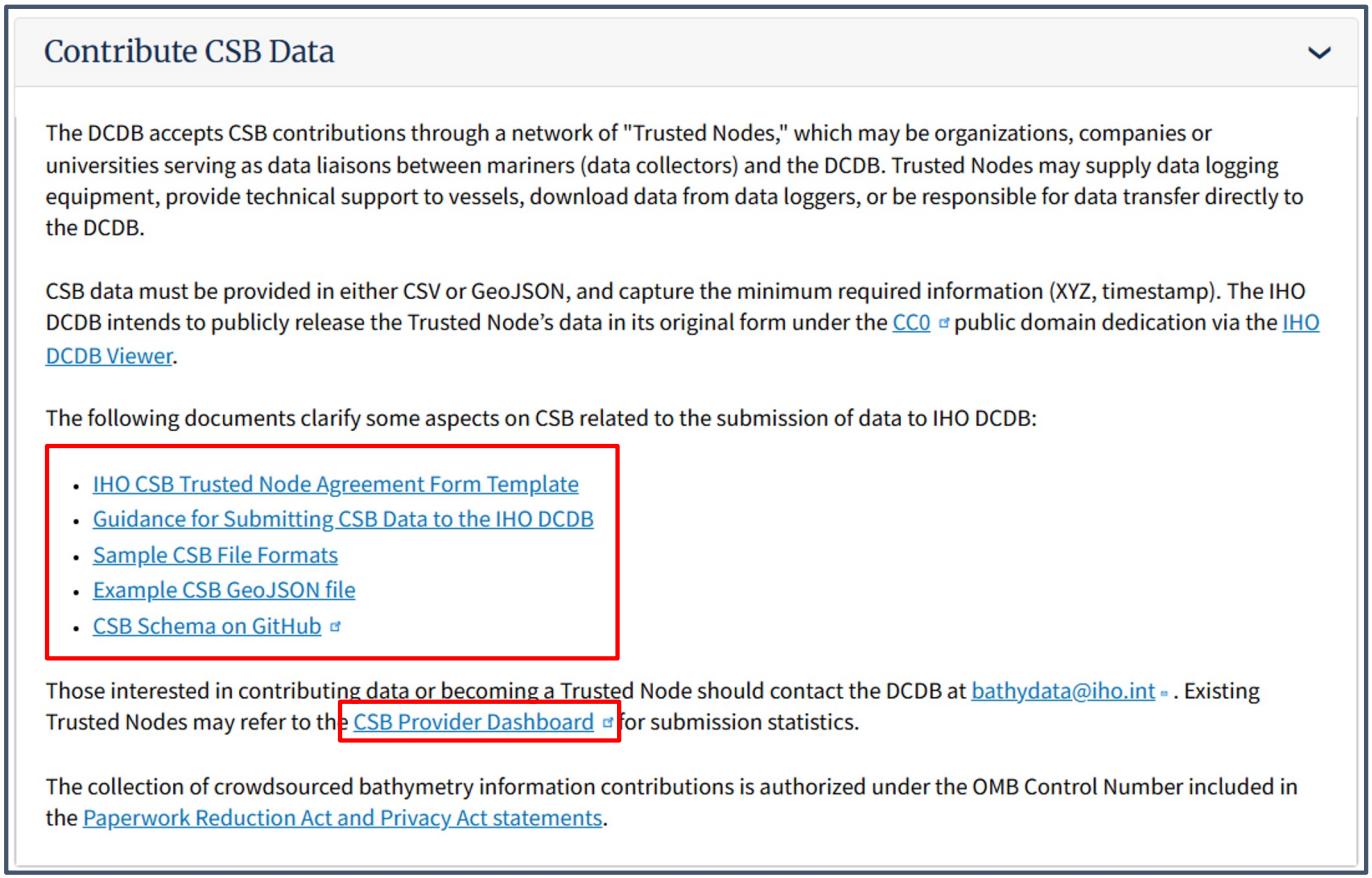
Once a **trusted node** is established, DCDB contacts the **trusted node** with any issues with data submitted, providing a streamlined way of addressing any data quality or integrity issues.



CSB Trusted Nodes

https://www.ncei.noaa.gov/iho-data-centre-digital-bathymetry

DCDB has a variety of resources on our website to assist trusted nodes with data preparation and setup.



Contribute CSB Data

The DCDB accepts CSB contributions through a network of "Trusted Nodes," which may be organizations, companies or universities serving as data liaisons between mariners (data collectors) and the DCDB. Trusted Nodes may supply data logging equipment, provide technical support to vessels, download data from data loggers, or be responsible for data transfer directly to the DCDB.

CSB data must be provided in either CSV or GeoJSON, and capture the minimum required information (XYZ, timestamp). The IHO DCDB intends to publicly release the Trusted Node's data in its original form under the CC0 public domain dedication via the IHO DCDB Viewer.

The following documents clarify some aspects on CSB related to the submission of data to IHO DCDB:

- IHO CSB Trusted Node Agreement Form Template
- Guidance for Submitting CSB Data to the IHO DCDB
- Sample CSB File Formats
- Example CSB GeoJSON file
- CSB Schema on GitHub

Those interested in contributing data or becoming a Trusted Node should contact the DCDB at bathydata@iho.int . Existing Trusted Nodes may refer to the CSB Provider Dashboard for submission statistics.

The collection of crowdsourced bathymetry information contributions is authorized under the OMB Control Number included in the Paperwork Reduction Act and Privacy Act statements.

CSB Trusted Nodes – Electronic Charting Systems

Mariners can enable their electronic charting system log file to record position, depth, and time.

www.pcmaritime.com

www.rosepointnav.com

Rose Point Navigation System

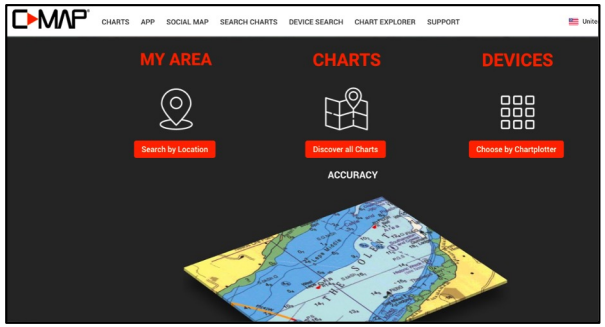
- When a mariner updates their software or chart catalog, data is transmitted to the DCDB

Navico C-MAP

- Recently finalized a new bathymetric feed

GEC Aqua Map

- Smartphone app that can be connected via Wifi to various NMEA devices like external GPS, depth sounders, AIS, etc.

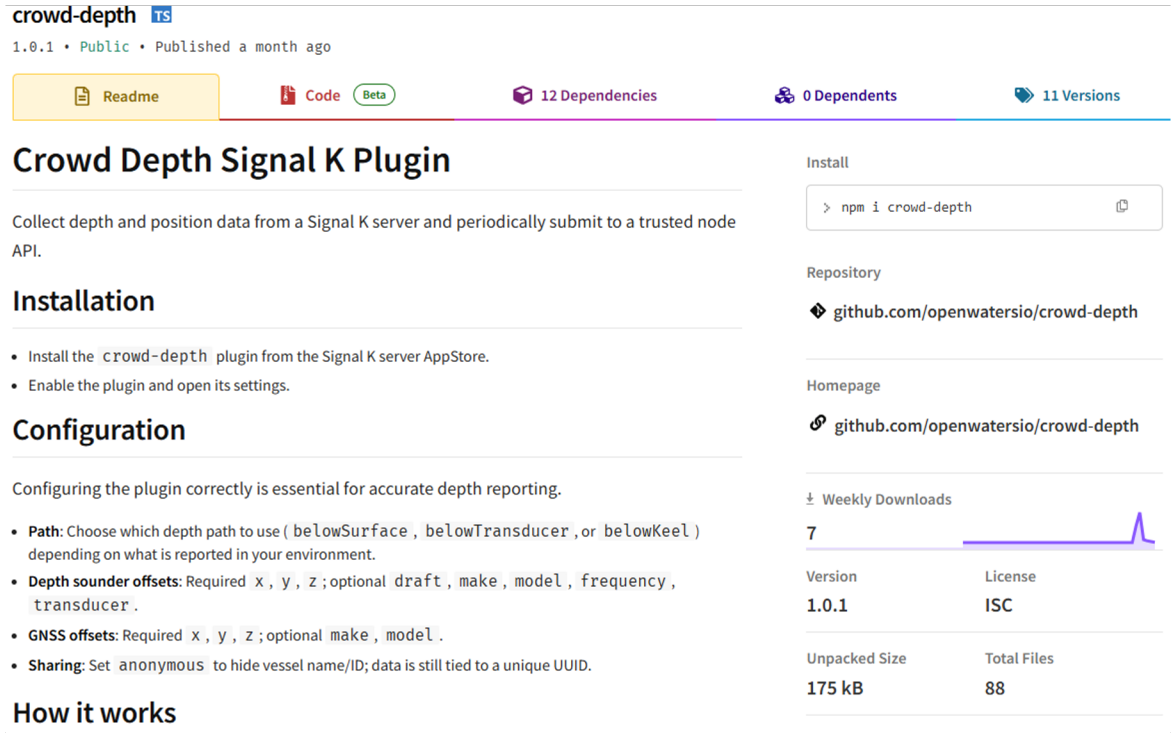


CSB Trusted Nodes – Marine Software Systems

International Hydrographic Organization

Signal K

- Implemented a data plugin for the Signal K open data format for marine use
- Plugin automatically sends contributors point depth data to DCDB via the Signal K hub



crowd-depth TS

1.0.1 • Public • Published a month ago

Readme | Code Beta | 12 Dependencies | 0 Dependents | 11 Versions

Crowd Depth Signal K Plugin

Collect depth and position data from a Signal K server and periodically submit to a trusted node API.

Installation

- Install the `crowd-depth` plugin from the Signal K server AppStore.
- Enable the plugin and open its settings.

Configuration

Configuring the plugin correctly is essential for accurate depth reporting.

- **Path**: Choose which depth path to use (`belowSurface` , `belowTransducer` , or `belowKeel`) depending on what is reported in your environment.
- **Depth sounder offsets**: Required `x` , `y` , `z` ; optional `draft` , `make` , `model` , `frequency` , `transducer` .
- **GNSS offsets**: Required `x` , `y` , `z` ; optional `make` , `model` .
- **Sharing**: Set `anonymous` to hide vessel name/ID; data is still tied to a unique UUID.

How it works

Install

`npm i crowd-depth`

Repository

github.com/openwatersio/crowd-depth

Homepage

github.com/openwatersio/crowd-depth

Weekly Downloads

7

Version 1.0.1

License ISC

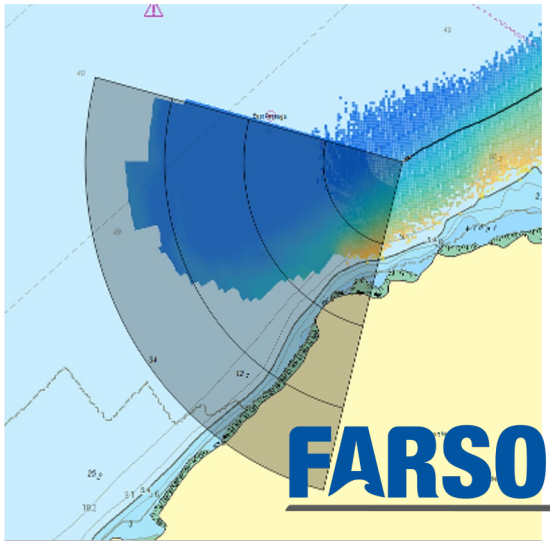
Unpacked Size 175 kB

Total Files 88

CSB Trusted Nodes – Hardware Companies

FarSounder Inc.

- Designs and manufactures 3D Forward Looking Sonar (3D-FLS) for navigation and obstacle avoidance
- Customers are given the option to participate in CSB collection and contribution



Orange Force Marine

- Utilizing their unique "Mussel" CSB kits and cloud-based data pipeline, OFM collects and transfers ashore bathymetric data from various vessels via a robust, non-intrusive, seamless hardware installation

ORANGE FORCE MARINE

CSB Trusted Nodes – Hardware Companies

Macgregor Germany (now Danelec)

- Macgregor Germany supplies Carnival Cruise Lines with VDR solutions.
- ***Voyage Data Recorders (VDR)*** are a mandated device for effectively all ships on international voyages.
- By default, this device is logging depth sounding data for IMO mandated shipborne single beam devices.
- A bathymetric feed was established between MacGregor and the DCDB

Voyage Data Recorder

CSB Trusted Nodes – Marine Contractors

Petroleum Geo-Services (PGS)

- Implemented a data feed from PGS vessels to the DCDB

M2Ocean

- Submission of small autonomous bathymetric buoy data

Alcatel Submarine Networks

- Submissions from a network of cable-laying vessels operating globally

CSB Trusted Nodes – Academia/Research

International Hydrographic Organization

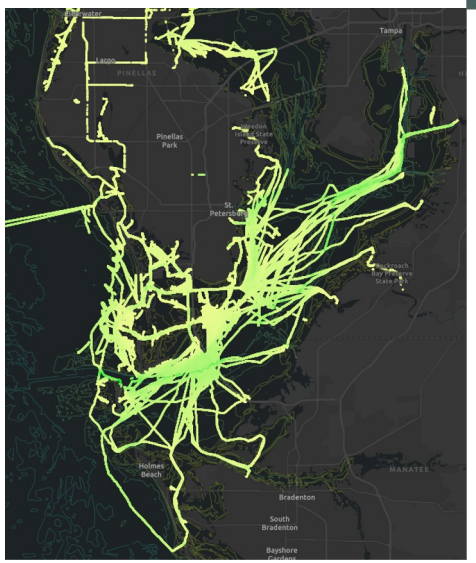
James Cook University

- Distributed inexpensive data loggers to ~10 volunteer vessels using their own echo sounder and GPS sensors along the Great Barrier Reef

SmartLog USB data logger

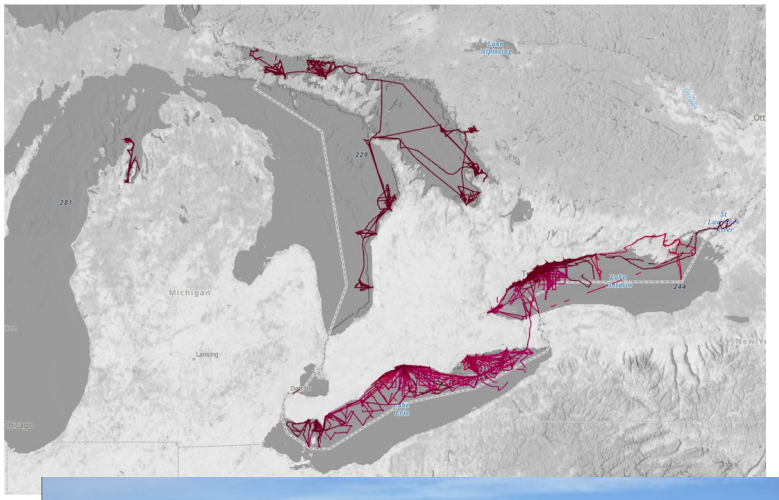
University of South Florida - COMIT

- Developed a program “Crowd the Bay” with support for local mariners to provide data in the region
- Provides support for volunteers and other trusted nodes in the CSB program



CROWD THE BAY

CSB Trusted Nodes – Non Profit



Great Lakes Observing System (GLOS)

- Data collected using the Orange Force Marine Mussel data logger.

Interdisciplinary Center for Development in Ocean Mapping (CIDCO)

- Data from a non-profit training and R&D organization in marine sciences and hydrography

International SeaKeepers Society

- Data from platforms participating in SeaKeepers events, research, and general member vessels

CSB Trusted Nodes – Seabed 2030 Project

International Hydrographic Organization

Objective:

1. Facilitate field trials that will accelerate CSB activity
2. Collect data in data scarce areas
3. Grow excitement about the CSB initiative!

In return, a potential program must guarantee the provision of staff to:

1. Hand out data loggers to the community
2. Assist local mariners in set up
3. *Provide a copy of these data to Seabed 2030 for inclusion into the DCDB and the GEBCO grid*

Support includes provision of data loggers (NMEA0183 and NMEA2000) and installation support (where needed).

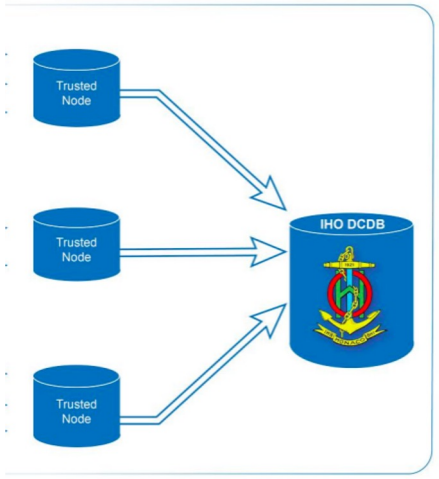
Prospective Trusted Nodes

Review CSB Documents on the DCDB Website

Determine if Your Organization is a Good Candidate

Schedule an Initial Meeting with DCDB & Review the Draft **Submission Agreement**

Assemble a Test Data Submission and Forward to DCDB for Review

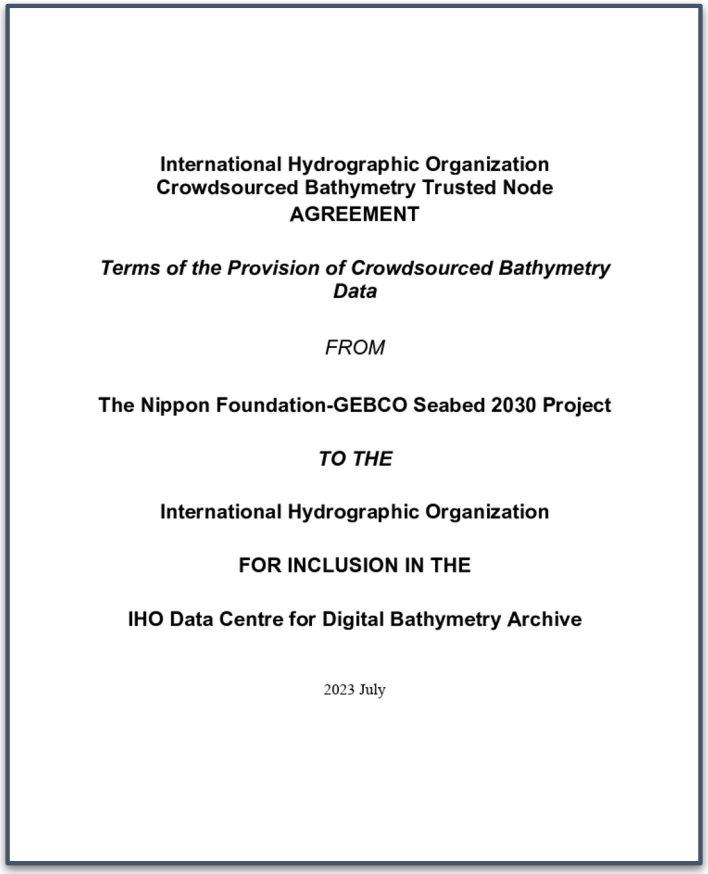


Prospective trusted nodes are encouraged to reach out to bathydata@iho.int to set up an initial discussion.

Prospective Trusted Nodes - Submission Agreement

The submission agreement serves as formal documentation of the roles and expectations of the trusted node and the DCDB. Generally a 5-page document, it can be modified at any time with concurrence of both parties.

Section 1: Introduction
Section 2: Background
Section 3: Purpose and Scope
Section 4: References
Section 5: Contacts
Section 6: IHO DCDB Data Archive and Services
Section 7: General Provisions



International Hydrographic Organization
Crowdsourced Bathymetry Trusted Node
AGREEMENT

Terms of the Provision of Crowdsourced Bathymetry Data

FROM

The Nippon Foundation-GEBCO Seabed 2030 Project

TO THE

International Hydrographic Organization

FOR INCLUSION IN THE

IHO Data Centre for Digital Bathymetry Archive

2023 July

Prospective Trusted Nodes - Submission Agreement

International Hydrographic Organization

Section 6: IHO DCDB Data Archive and Services

A. Creative Commons 1.0 Un

The Trusted Node is, voluntarily an
DCDB under a Creative Commons 1.

The IHO DCDB intends to store the T
Administration's (NOAA) National C
Furthermore, the IHO DCDB intends
the CC0 public domain dedication
interactive web map services.

In no event is the IHO DCDB liable t

By signing this TN Agreement, the Tr
data it provides to accept these terms

B. Data Submission

All Trusted Nodes are requested to review the ***CSB Data Submission to the IHO DCDB Guidance Document*** which provides detailed information and instructions on how to document, package and submit CSB data to the IHO DCDB.

Data submissions will consist of geojson files with metadata meeting or exceeding the minimum standards outlined in the B-12 CSB Guidance Document found on the IHO Bathymetric Publication webpage. Data will primarily be raw, as collected, with the coordinate reference system and position reference point specified in the metadata. If any processing steps are applied additional metadata fields as outlined in the guidance document should be added if possible.

Seabed 2030 will submit CSB data files and metadata to the DCDB public application programming interface (API) using an authentication token provided by the DCDB Data Manager. Additional information on data submission is available in the external document Guidance for Submitting CSB Data to the IHO DCDB.

Description of data submission frequency: raw CSB data are supplied by the data contributors to the Trusted Node at the GDACC on an ad hoc basis and will be processed and delivered to the IHO DCDB in a timely manner to best endeavors.

Processed CSB data will be uploaded to the IHO DCDB via their submission API and notification will be sent via email to bathydata@iho.int.

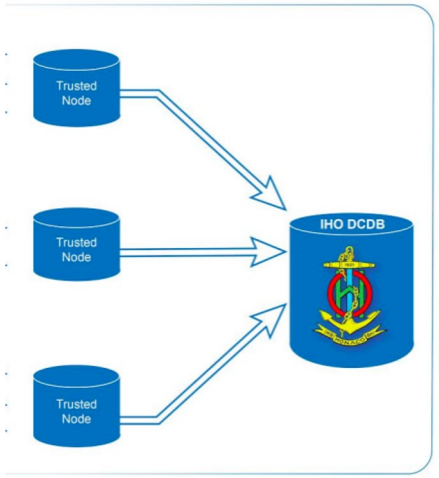
Prospective Trusted Nodes

Review Test Submission Process & Issue Secure Token

Review & Sign Submission Agreement with DCDB

Continue Testing with DCDB; Transition to Production Submission

Monitor & Support



Prospective trusted nodes are encouraged to reach out to bathydata@iho.int to set up an initial discussion.

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International Hydrographic Organization

Trusted Nodes - Discussion

- **Trusted Nodes** make the CSB project possible! They surely do more than what we have listed here, but the intent of this overview is to summarize general expectations of a CSB trusted node.

- We look forward to learning more about particular processes that are in place with our existing trusted node providers!

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