

# Work Item D

**Gather and prioritize HO-specific issues relating to CSB data, including but not limited to Nautical Cartography**

Report to CSBWG Intersessional

Virtual Meeting

15 October 2024

By Anthony Klemm

Work Item D Lead



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## **Work Item Team Members**

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Giuseppe Masetti – Denmark

Hans Oias – Sweden

Andrew Talbot – United Kingdom (UKHO)

Michel Breton – Canada

Akim Mahmud – USA (NGA)

Anthony Klemm – USA (NOAA)



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## Work Item Background & Purpose

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*This Work Item is important for the development and sharing of best-practices on processing and the utility of CSB for Hydrographic Offices, including supporting safe navigation.*

*The intentions of this work group are to facilitate collaboration between Hydrographic Offices on best practices of how to use CSB data from the DCDB. This includes providing recommendations back to the DCDB on how to improve data support and access, as well as sharing methods on processing/correcting CSB data, and evaluating its quality.*

*We feel that as more CSB is used and evaluated by Hydrographic Offices, it will provide a catalyst to for more potential contributors and users to participate in CSB.*



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## **Progress Since CSBWG15**

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### **D-1.1 – Status: Ongoing**

#### **Produce guidance for use of CSB data for SOLAS nautical cartography and other products**

- Hans (Sweden) has demonstrated example usage of S-44 Annex A matrix for CSB data;  
  
Canada, USA, and other HOs to document and share comparative uncertainty/quality assessment methodologies
- NOAA currently using 10m horizontal uncertainty estimation, and up to CATZOC C depth precision definition to quantify uncertainty values; Still working on more robust uncertainty estimation



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## **Progress Since CSBWG15**

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### D-2.1 – Status: Ongoing

**Evaluate the CSB data stored in the IHO DCDB for use in nautical cartography.**

Develop, share, and collaborate on CSB outlier detection algorithms and AI models both spatially and in a timeseries space



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### D-2.1 – Discussion

**Evaluate the CSB data stored in the IHO DCDB for use in nautical cartography.**

Empty datafiles and erroneous data within files (data with raw depth = 0.0m, etc...) continue to be a significant burden and source of friction to efficient processing. Outliers in data also continue to be a persistent and critical issue.



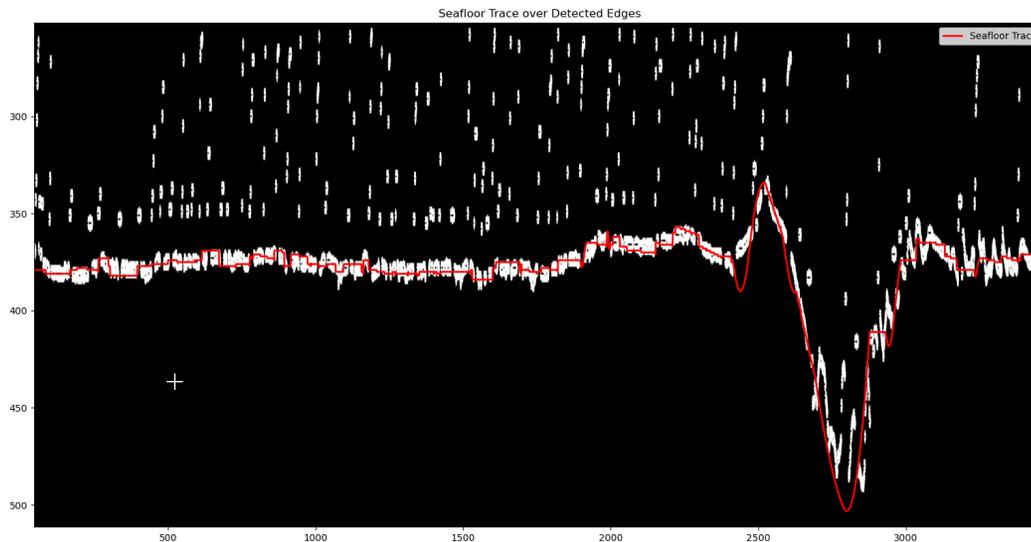
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### D-2.1 – Discussion

NOAA currently using Computer Vision and statistical functions to flag outliers in CSB timeseries data, but the results are very aggressive (more than optimal number of false positives). NOAA also building large training set to feed more robust ML/AI models;





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### D-2.2 – Status: Ongoing

**Evaluate the CSB data stored in the IHO DCDB for use in nautical cartography.**

Develop and share Data Engineering solutions to query DCDB at routine time frequency to pull and process latest data (e.g., at a monthly period)



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## D-2.2 – Discussion

**Develop and share Data Engineering solutions to query DCDB at routine time frequency to pull and process latest data (e.g., at a monthly period)**

NOAA currently has a working solution to pull latest data (at 1 month schedule) using Point Store API and custom DCDB scraper script.



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## Progress Since CSBWG15

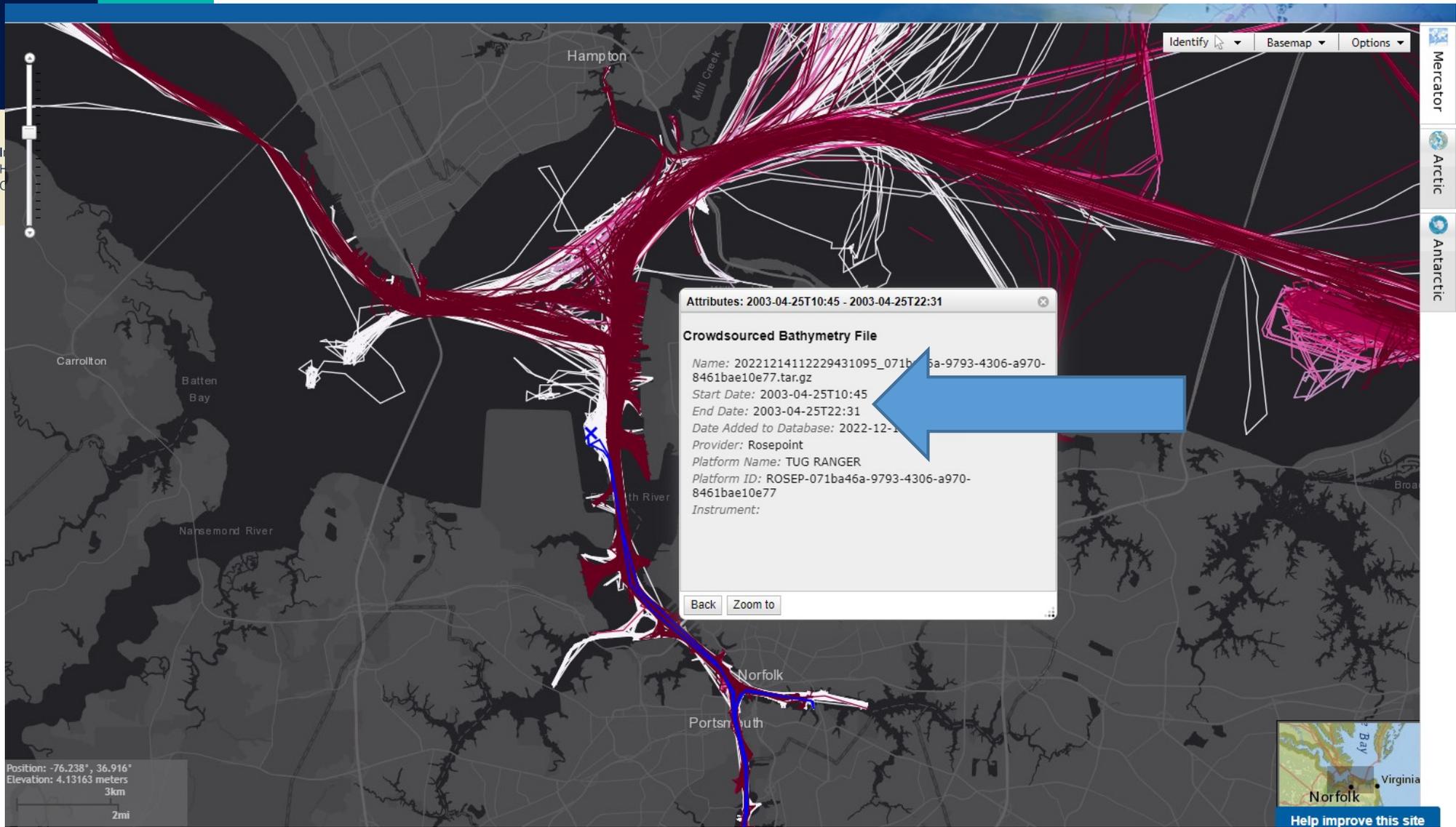
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### D-2.3 – Status: Ongoing

**Evaluate the CSB data stored in the IHO DCDB for use in nautical cartography.**

Need clarity from DCDB on path forward for TUG RANGER timestamp offset correction

Should/can it be updated in the DCDB for others to use corrected timestamp of +7168 days?



Identify Basemap Options

- Mercator
- Arctic
- Antarctic

Attributes: 2003-04-25T10:45 - 2003-04-25T22:31

**Crowdsourced Bathymetry File**

Name: 20221214112229431095\_071b...ba-9793-4306-a970-8461bae10e77.tar.gz

Start Date: 2003-04-25T10:45

End Date: 2003-04-25T22:31

Date Added to Database: 2022-12-1

Provider: Rosepoint

Platform Name: TUG RANGER

Platform ID: ROSEP-071ba46a-9793-4306-a970-8461bae10e77

Instrument:

Back Zoom to

Position: -76.238°, 36.916°  
Elevation: 4.13163 meters  
3km  
2mi



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### D-2.4 – Status: Ongoing

**Evaluate the CSB data stored in the IHO DCDB for use in nautical cartography.**

WG requests process to formally request changes to data fields.

Context: Work Group seeking addition of Speed field (SOG from GNSS receiver) to be added to data fields from contributors to aid in Data quality assessment and outlier detection.

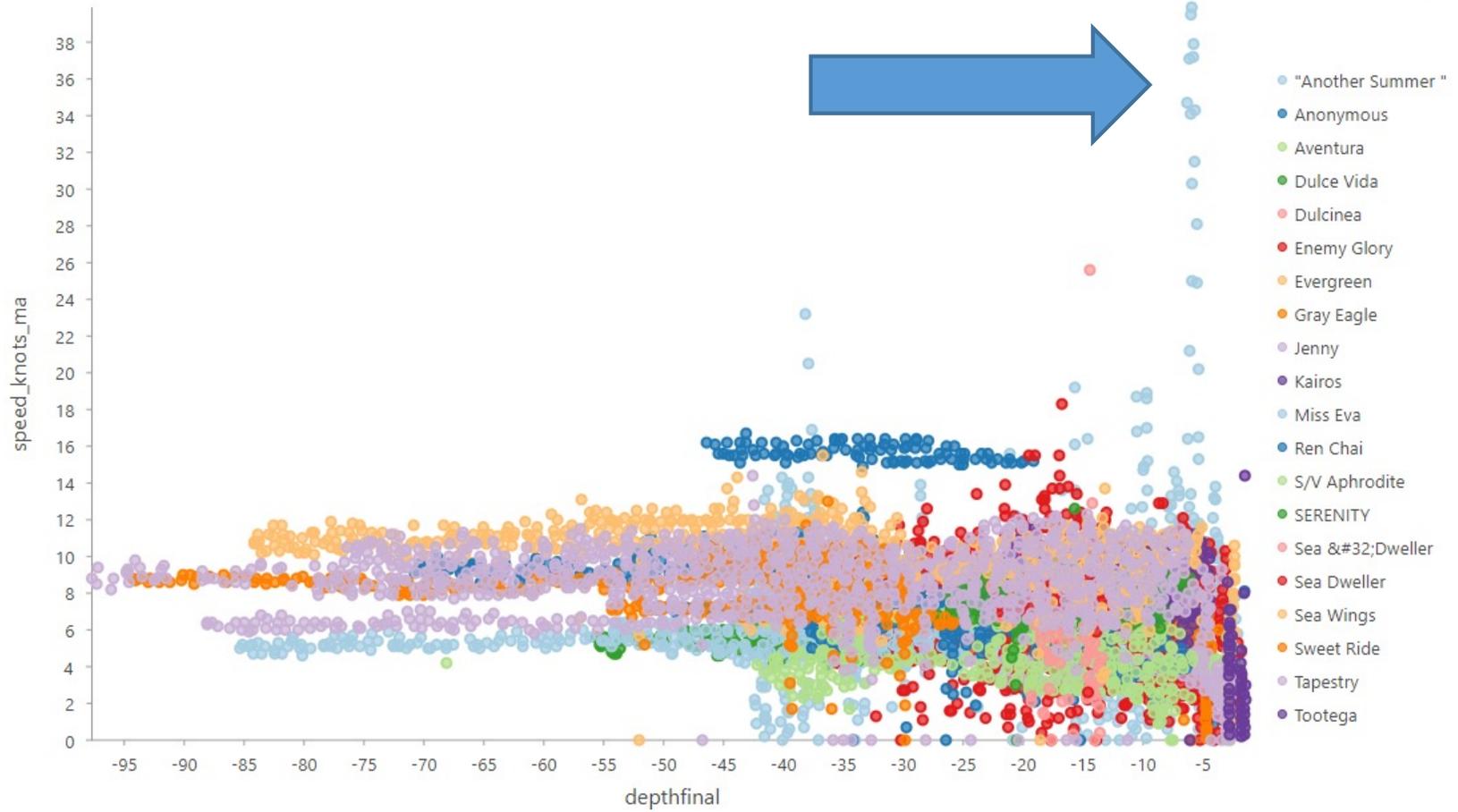


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# Progress Since CSBWG15

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Relationship between depthfinal and speed\_knots\_ma by platform\_name\_x





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## **Progress Since CSBWG15**

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### D-2.5 – Status: Ongoing

**Evaluate the CSB data stored in the IHO DCDB for use in nautical cartography.**

Collaborate between HOs and other organizations on best practices to highlight and detect bathymetric discrepancies with CSB data

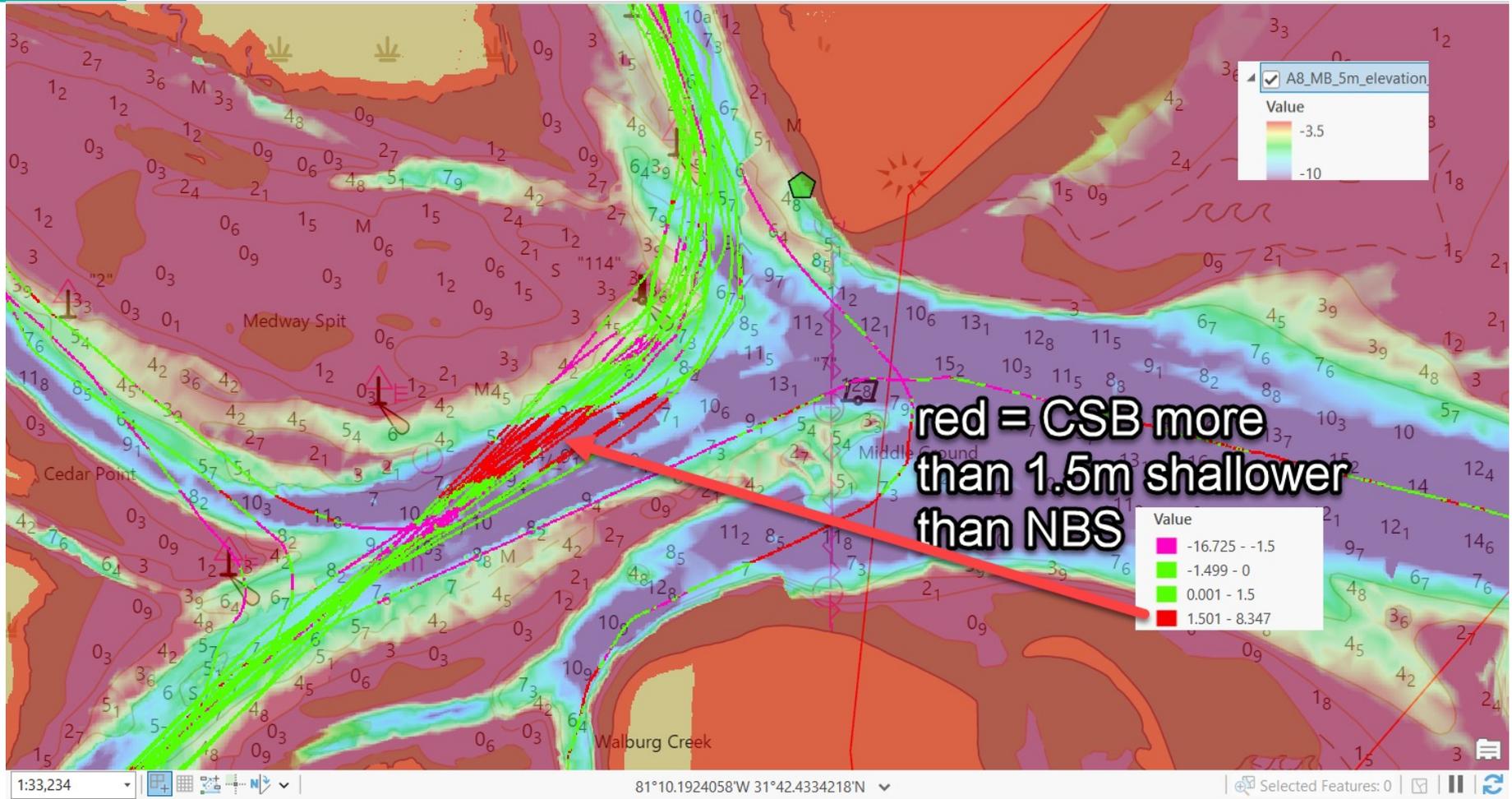
-Standardize visualizations/detection methods of CSB for detecting bathy discrepancies?



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# D-2.5 example of using CSB for detecting and visualizing bathymetric discrepancies

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### D-3 – Status: Ongoing

**Engage with industry to ensure the required tools exist to efficiently use DCDB-hosted CSB data for navigational products.**

The need was highlighted to engage with ECDIS manufacturers and other navigation systems to add software capability to log and transmit CSB data to increase CSB collector pool

It is expedient to act now as ECDIS manufacturers develop new systems compatible with S-100



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### D-4 – Status: Ongoing

**Engage with other IHO WGs to ensure suitable standards exist for describing CSB data and displaying CSB data on ECDIS.**

No updates at this time



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## Progress Since CSBWG15

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- *Canada has produced full data pipeline for processing CSB data and NavWarning assessment tool.*
- *Denmark has incorporated CSB data into their latest national bathymetry model (has not yet made it to the for-navigation products)*



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## Progress Since CSBWG15

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- *Sweden has demonstrated how the S-44 Annex A matrix may be used to characterize the quality of CSB data; Note: HOs are not required to use the Annex A matrix but it may help*
- *NOAA has developed a cursory open-source outlier flagging algorithm using CV and statistical methods in a timeseries dimension (although further testing and modification of parameters is required as current script produces many false-positives). Collaboration on tools/methods to effectively flag outliers in CSB data is of utmost importance to this Work Group.*



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## **Planned Activities**

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Collaboration and sharing of best practices between Hydrographic Offices for:

- Data Pipeline Engineering (scraping, processing, etc...)
- Bathy Discrepancy analysis, detection, and visualization
- Automation in Data cleaning and outlier detection



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## **Planned Activities**

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### Regular Engagement with IHO DCDB and other Work Item Groups within the IHO CSBWG

- Cleaning up erroneous and empty data files
- Fixing timestamp data for Tug Ranger
- Proposal for adding Speed Over Ground to data submission schema



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## **Issues/Risks/Concerns/Barriers**

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Resourcing among Hydrographic  
Offices is very lean with respect to  
CSB at this time



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Requests to CSBWG

None

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