14th Conference of the Arctic Regional Hydrographic Commission

GEBCO-SB2030-CSB

Agenda item C5

ARHC14, Tromsø Norway 3-5 September 2024

Highlights

International Hydrographic Organization

1. New GEBCO Strategy
2. GEBCO Governance Review
3. Celebration 120-year anniversary
4. Ocean Mapping focus at Barcelona April 2024 + Nice June 2025
5. SB2030
6. Sub-Committee highlights
7. GGC41 in Fiji, jointly with SB2030 Pacific RDACC

IHO

International Hydrographic Organization

New GEBCO strategy, endorsed by IHO + IOC

Vision:

To bring knowledge about our planet's seabed to everyone

Mission:

To produce free, open and complete seabed data and information for the world's oceans.

This is achieved by enabling and inspiring seabed mapping efforts through international collaboration, technological innovation, capacity development, and education.

GEBCO Governance Review, endorsed by IHO + IOC

SCOPE

- Mapping of GEBCO organizational and functional structure, detailing the nature of any relationships, reporting lines, obligations or liabilities;
- Review of the legal structure and framework with a statement on the current and recommended future status (if change is deemed necessary);
- Review of financial arrangements with a statement on the current and recommended future status (if change is deemed necessary);
- A gap analysis of the current governance instruments (e.g. MoUs, ToRs etc.);

GGC has started to organize implementation (if + how + priority) of both strategy and governance review

IHO

International Hydrographic Organization

Ocean Mapping focus

…is increasing as more people from different disciplines, countries and decision levels are becoming more aware of the relationship between seabed knowledge and:

1. Improved climate modelling
2. Marine biodiversity discovery and monitoring
3. Offshore wind planning process

- UN Ocean Decade conference Barcelona April 2024
- UN Ocean Conference Nice June 2025
- New IOC Executive Secretary

International Hydrographic Organization

REVIEW OF USER REQUIREMENTS AND CONTRIBUTIONS TO GEBCO PRODUCTS 2024

- 63 responses from 38 countries
- Highly supportive of GEBCO, 90% valuing GEBCO gridded bathy sets, 70% GEBCO web-service, >60% undersea feature names + Cap. Dev. aspects of GEBCO
- Request for higher resolution products
- Interest in expanding scope of GEBCO products
- Request for greater choice of file formats, including better visualization tools
- Request for an international seabed data users group

International Hydrographic Organization

Highlights GEBCO Sub-Committees

- Improved cooperation / harmonization between SC's, work from new strategy
- SCUFN: max 25 naming proposals per country per year, max 250 total, South China Sea no-og area for undersea feature naming
- TSCOM: work on improving availability, discoverability and accessibility of bathymetric data
- SCRUM: Supporting regional CSB/SB2030 coordinators
- SCOPE: new tasks and comms strategy under development
- SCET: Identify relevant institutions that provide ocean mapping and oceanography courses, work in progress.

THE NIPPON FOUNDATION-GEBCO
SEABED 2030

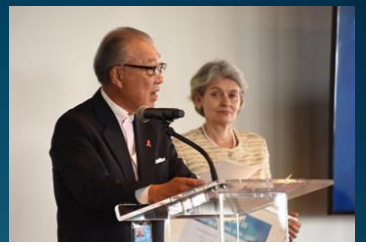
SEABED 2030

Energizing Ocean Floor Mapping

Jamie McMichael-Phillips
Seabed 2030 Director

The Nippon Foundation-GEBCO Seabed 2030 Project

Forum for Future Ocean Floor Mapping



THE OCEAN CONFERENCE
UNITED NATIONS, NEW YORK, 5-9 JUNE 2017

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Flagship Programme

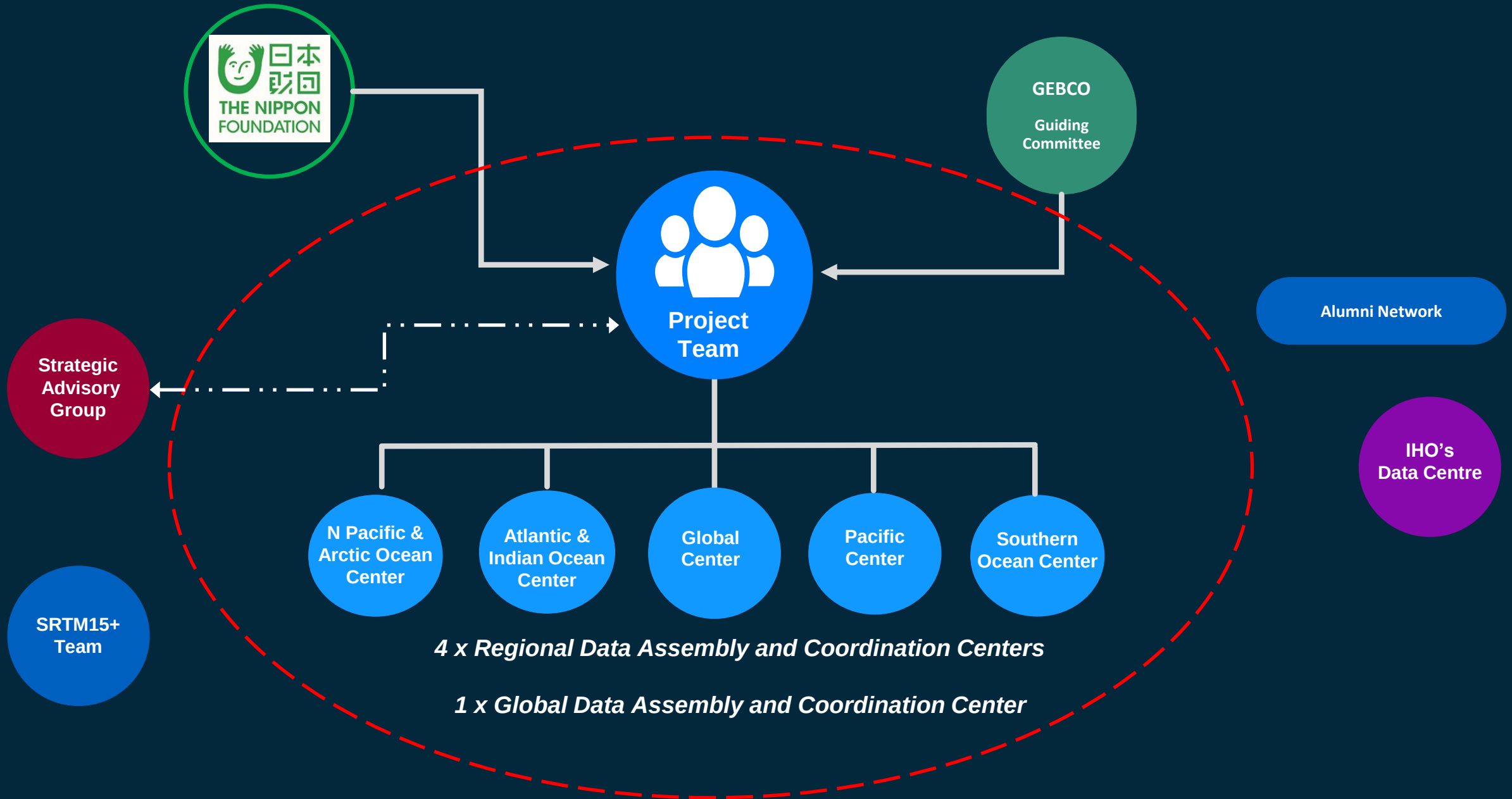
June 2016 → **June 2017** → **June 2021**

Seabed 2030 = accelerator to GEBCO's aim

Collaboration to:

- **inspire 100% seabed mapping by 2030**
- **compile the GEBCO Map**

Seabed 2030 Simplified Network

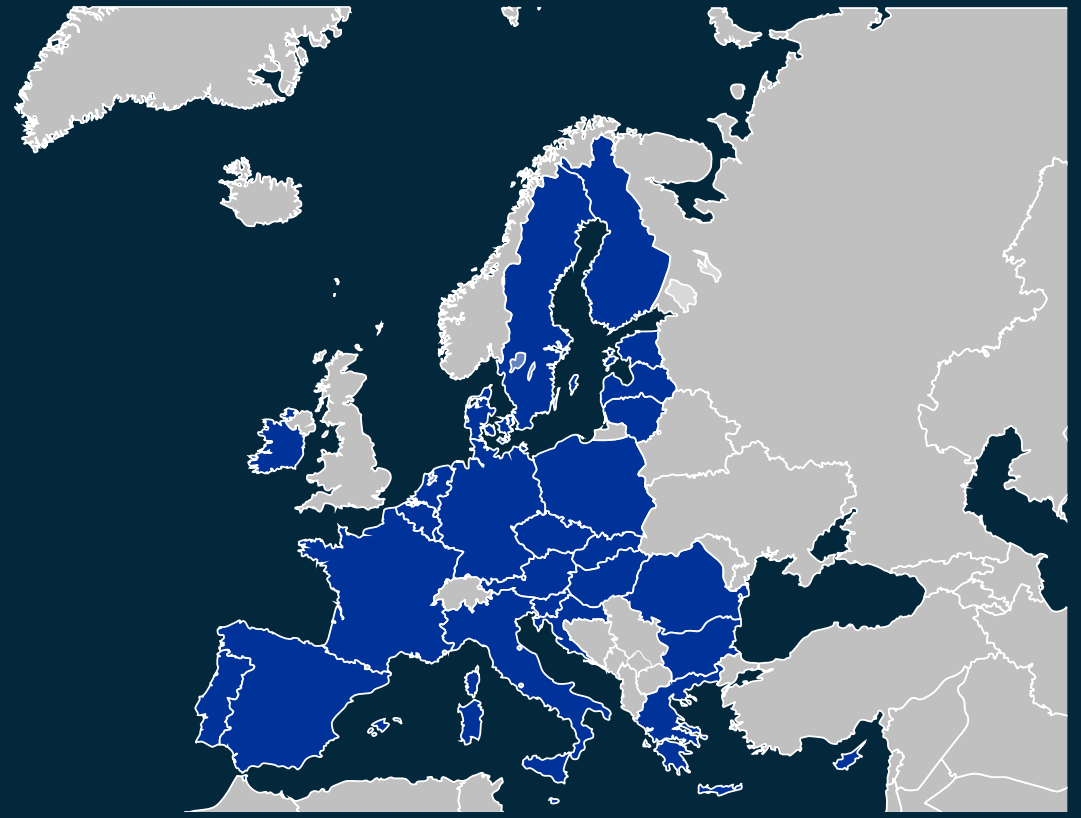


Progress last year

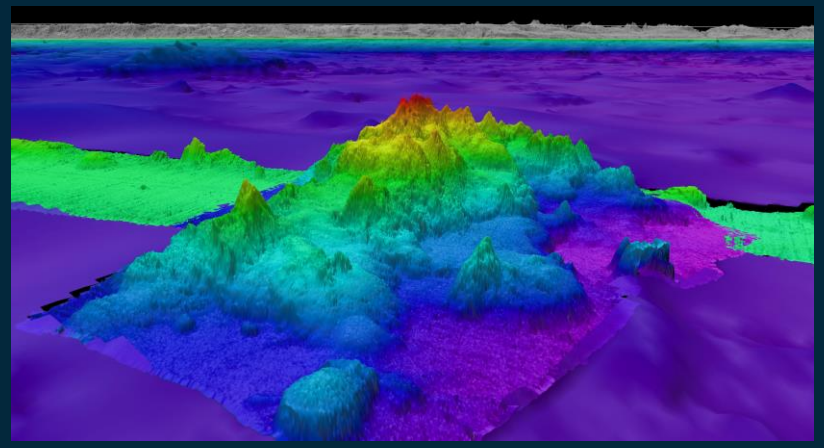
Apr 23 to Jun 24

4.34 million km^2 new bathymetry added

- **Equates to size of EU**



Credit: Wikipedia Kolja21



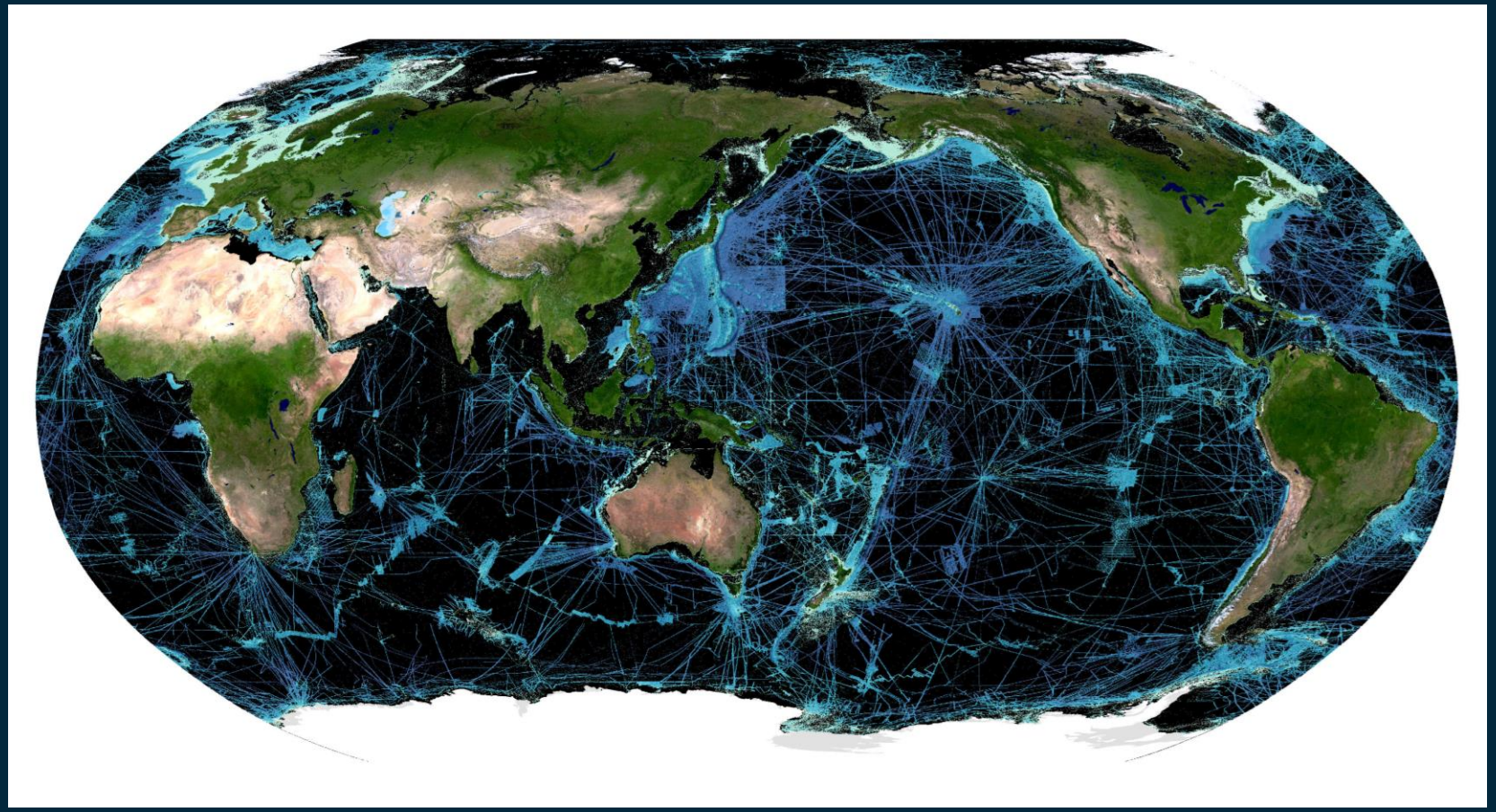
Courtesy: Martin Jakobsson, SU

…. a significant quantity of data ….

Progress so far … (cont'd)

GEBCO Map:

- *6% in 2017*
- Now **26.1%**

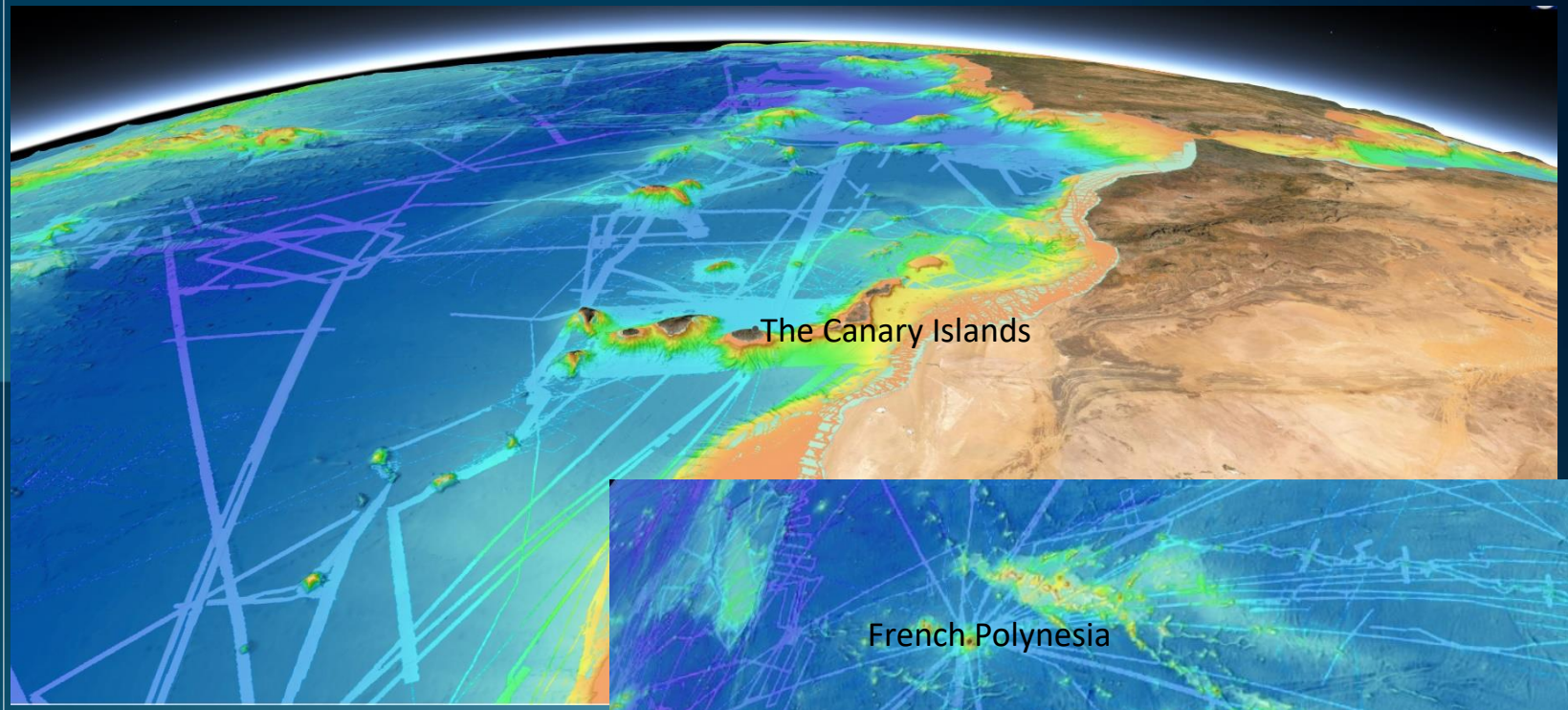


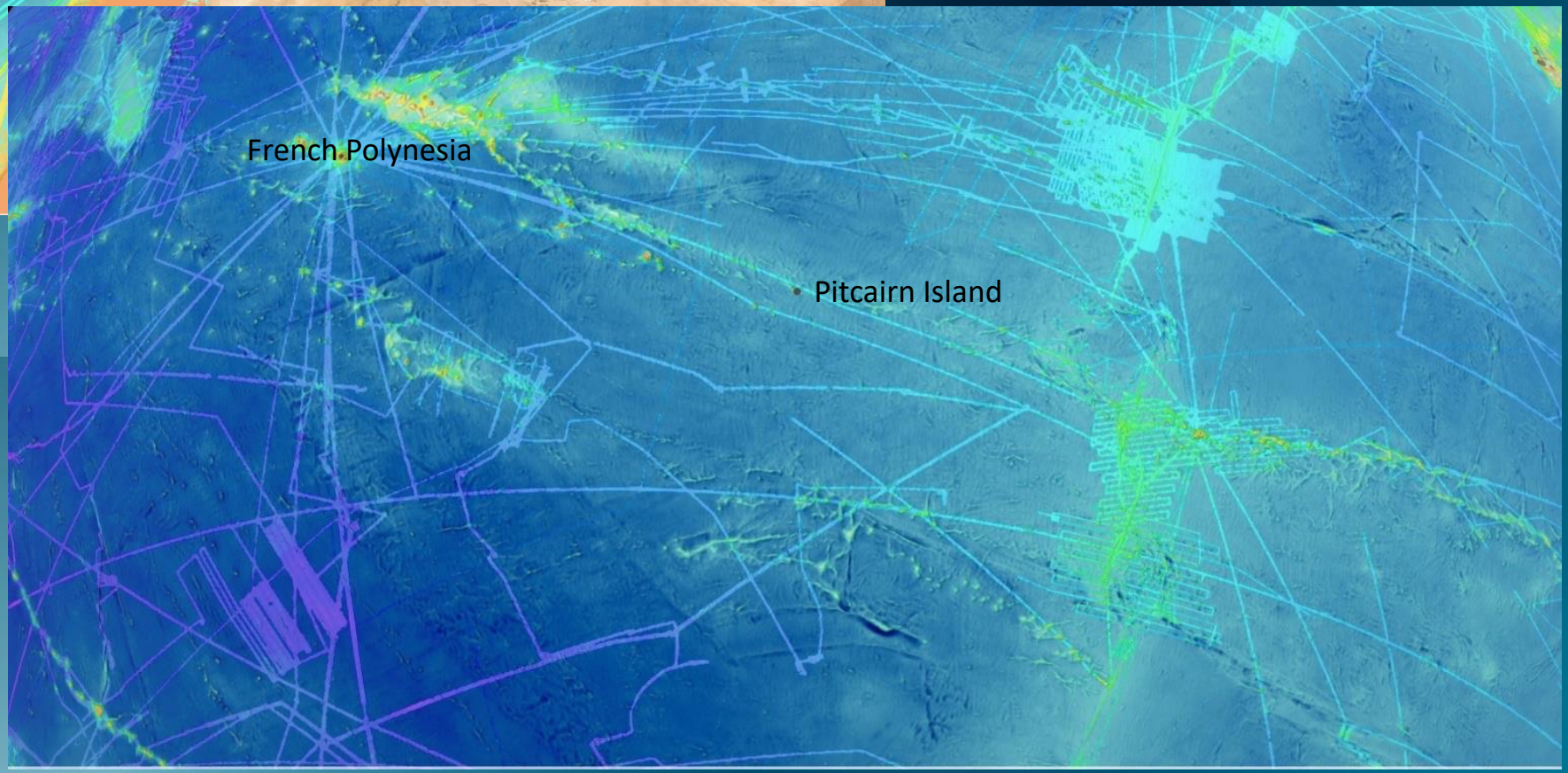
Courtesy: Martin Jakobsson, SU

Just under 3/4 of ocean floor still to go …..

SEABED 2030

Paucity of Depth Information





To manage effectively …..

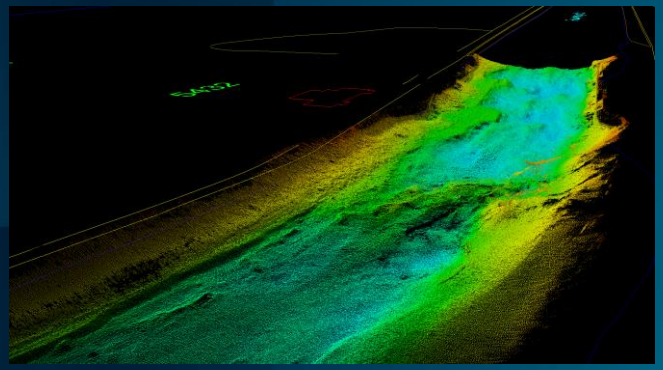
…we <u>must</u> map

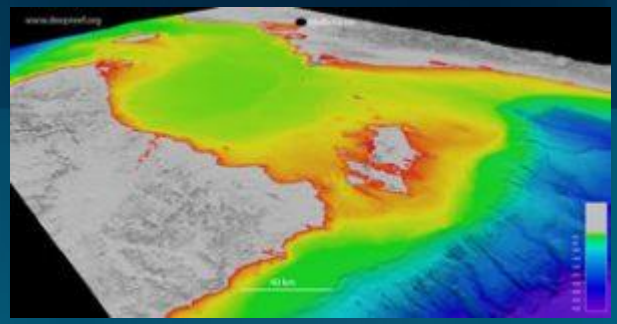
What is meant by data?

Any form of data that contains a bathymetric measurement is gratefully accepted by Seabed 2030 and by GEBCO!

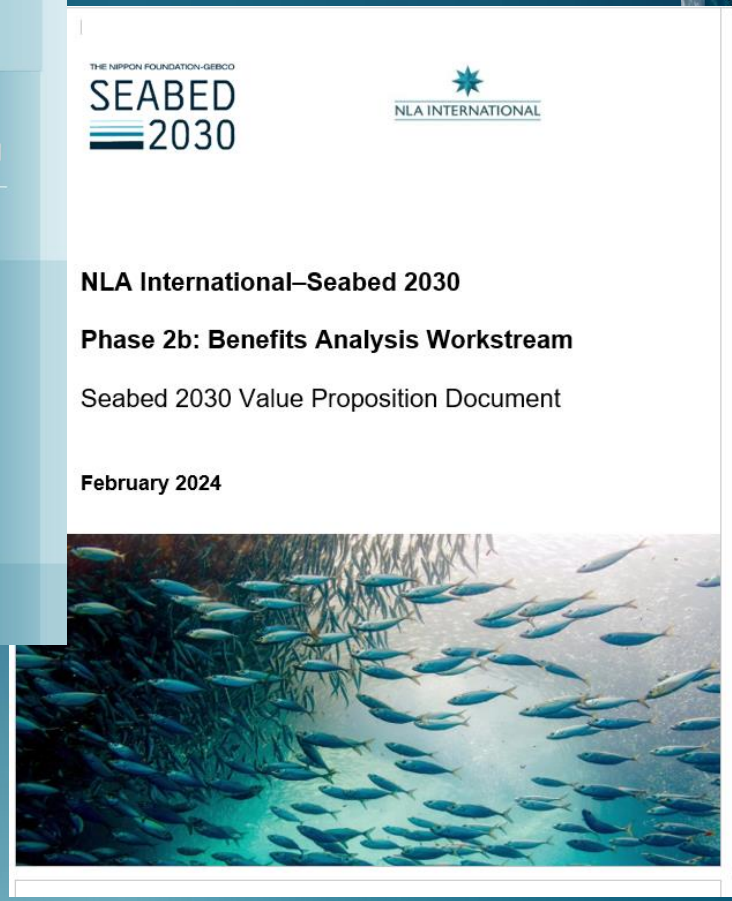
Examples of data are:

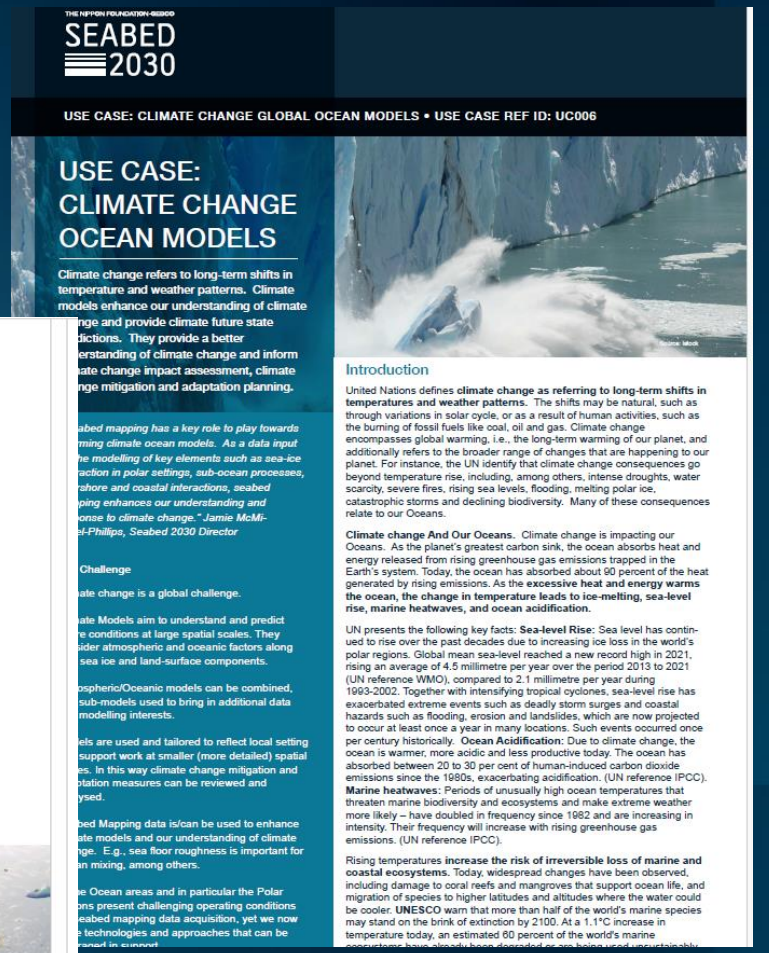
- Sounding sheets
- Raw data from sounders
- NMEA data (e.g. from CSB data loggers)
- Processed data (e.g. GSF or XYZ)
- S-57 ENC
- Processed grids or bathymetric surfaces
- Regional bathymetric products





Benefits Analysis





Detailed work based on research, interviews and surveys

Benefits Analysis – Use Cases

1: Seabed Mapping Innovation

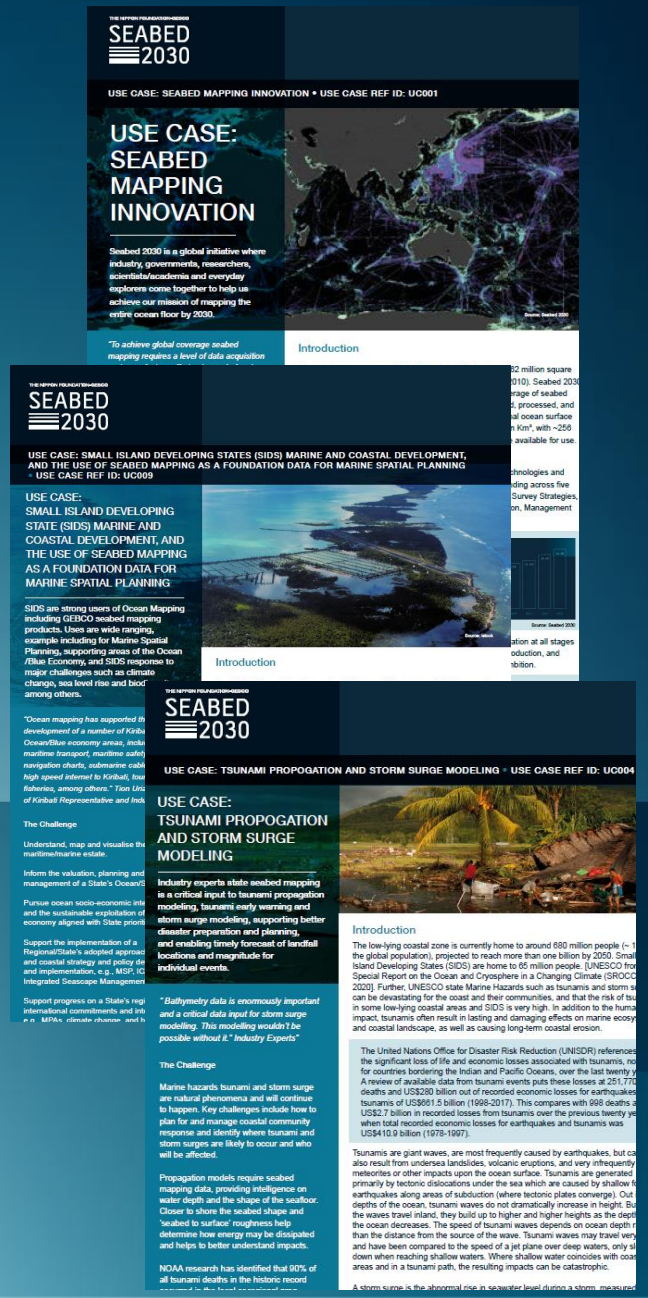
2: EEZ Seabed Mapping in the Absence of a National HO

3: Subsea Cable Planning & Design

4: Tsunami Propagation & Storm Surge Modeling

5: Renewable Energy - Offshore Wind Energy

6: Climate Change Ocean Models



7: SIDS* - Sea Level Rise and Coastal Inundation

8: Marine Biodiversity

9: SIDS* - Marine & Coastal Development, & Use of Seabed Mapping as Foundation Data for Marine Spatial Planning

10: Government Policy

11: Ocean Discovery &Ocean Exploration

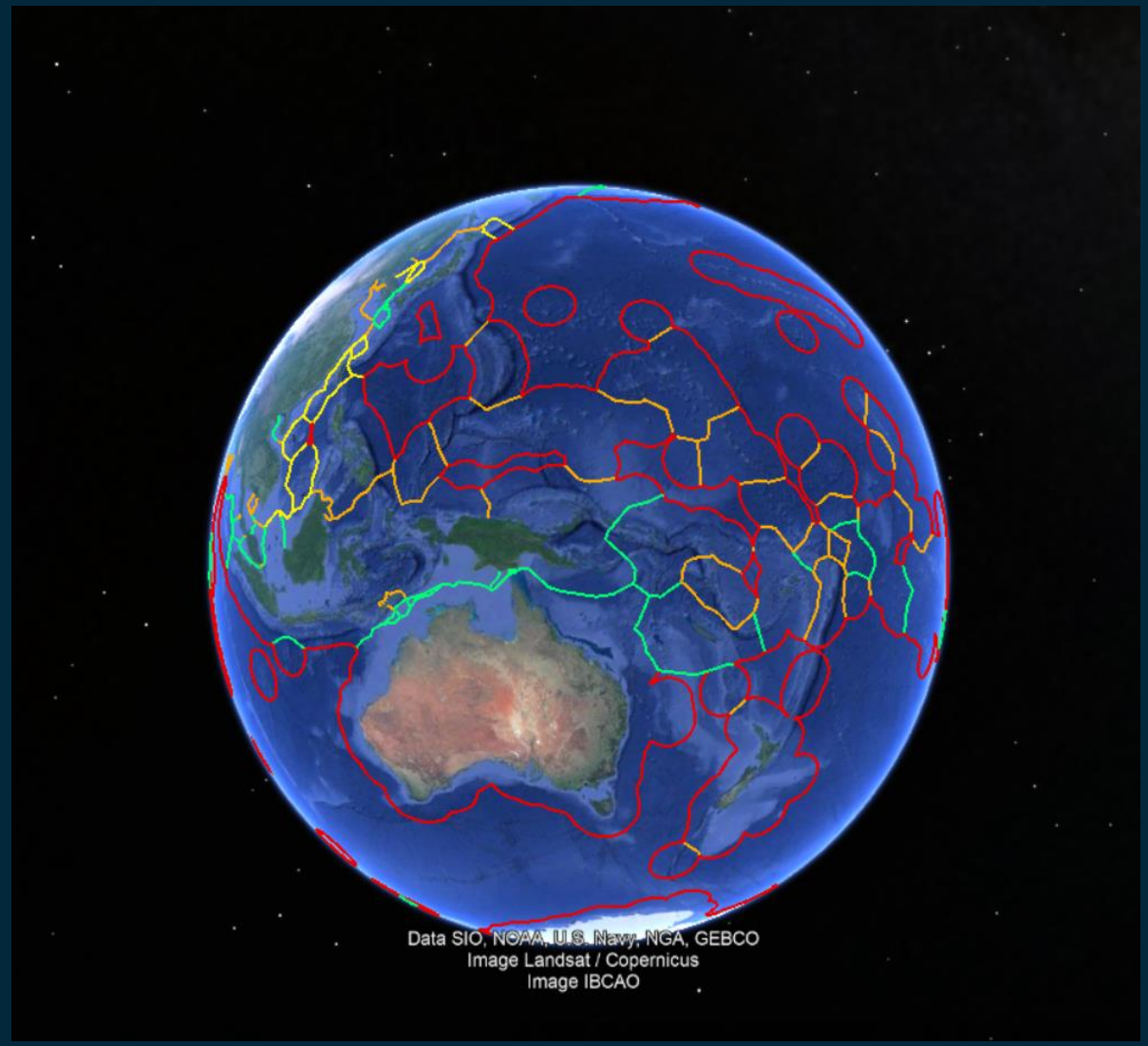
12: Driving Hydrographic Industry Expansion & Human Capital Benefits

*(*Small Island Developing States)*

SEABED 2030

CHALLENGES WE FACE:

- Reluctance to release existing data
- Who will pay for new data collection?
  - especially beyond national jurisdiction
- Even if someone pays – reluctance to grant permission - MSR

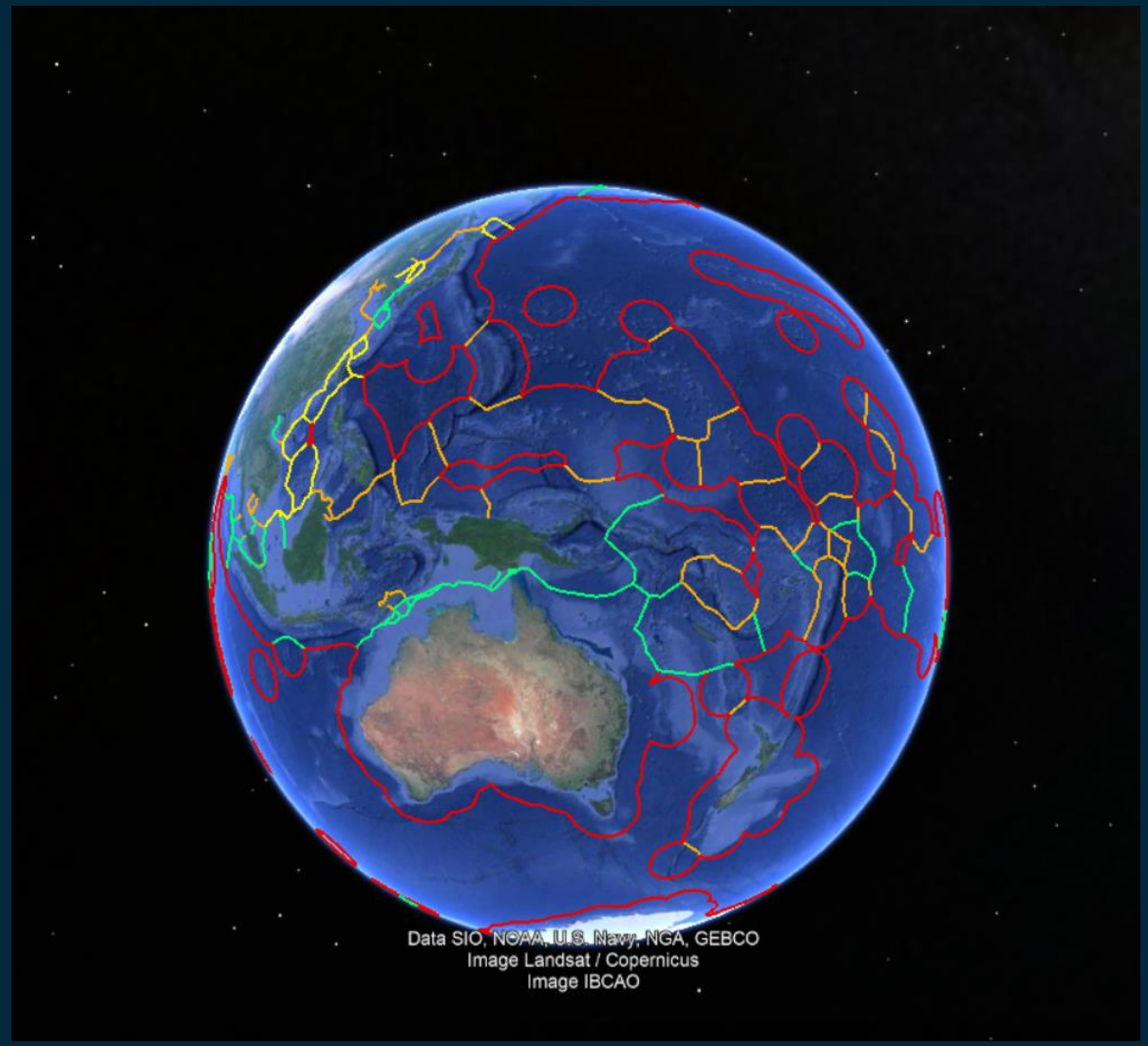


Credit: UNH/CCOM-JHC

OPPORTUNITIES:

- Collaborate in forming regional alliances
  - to encourage new mapping.

- Develop mechanism to allows bathymetry acquisition
  - in support of
    - SB2030
    - SDG14
    - Ocean Decade
  - without MSR regime constraints



Credit: UNH/CCOM-JHC

WIOBathy Project – Supporting Ocean Mapping

- **Bathymetry Collation & compilation in Western Indian Ocean (WIO)**
  - **Multi-scale & multi-resolution**
  - **First bathymetric map of WIO region**
- **Project Team of 8 Nippon Foundation-GEBCO Fellows:**
  - **Kenya, Tanzania, Mauritius & Madagascar**
- **Supported by Fellows from South Africa**
- **Championed by The Nippon Foundation**
- **Reaching out to other regional collaborators**

Credit: Amon Kimeli


ocean
PAVILION
#ForOurBluePlanet


ocean
PAVILION
For our blue planet


SEABED
2030
BUILD FUNDAMENTAL ECOLOGICAL UNDERSTANDING
BUILD CAPACITY FOR DEEP-OCEAN RESEARCH
INCREASE USE OF DEEP-OCEAN KNOWLEDGE
OBIS
DOSI


150


OCEAN
TEACHER
GLOBAL
SEABED
2030


SEABED
2030


unesco


Helping us make it happen …..

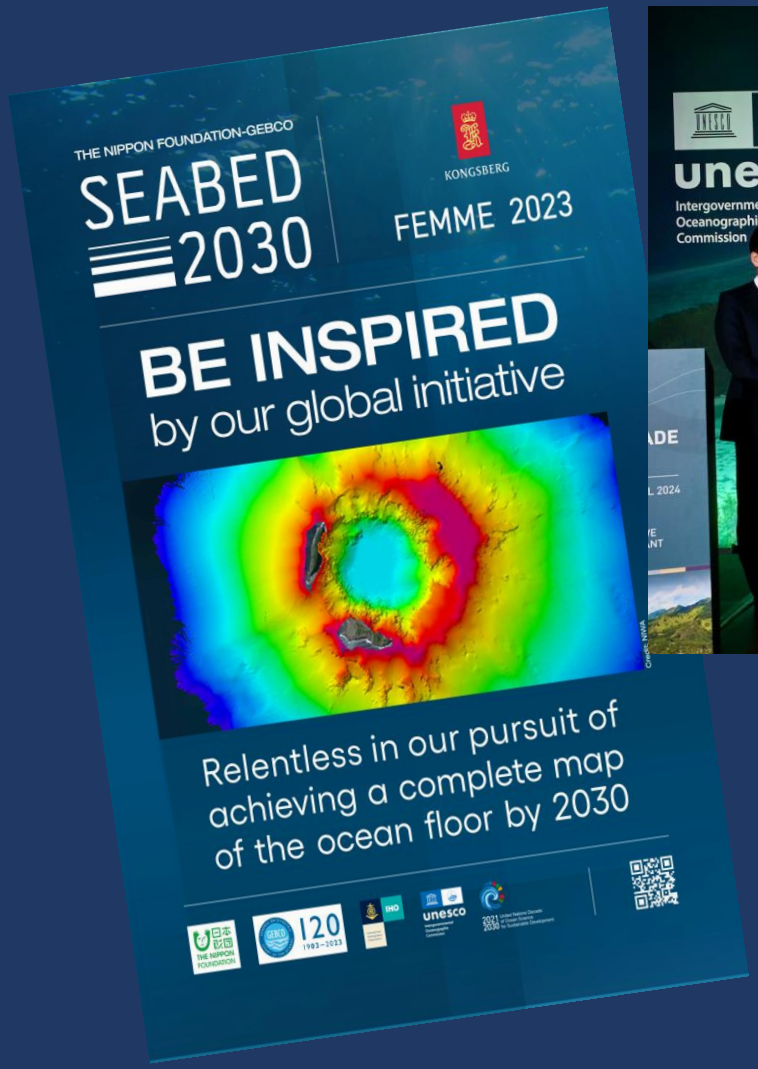

esri
Trimble
GWF

2024 OCEAN DECADE
CONFERENCE
BARCELONA, SPAIN 10-12 APRIL 2024

THE NIPPON FOUNDATION-GEBCO
SEABED 2030

Helping us make it happen …..

Outreach is vital, engage widely, & as early as possible.



Thank you

THE NIPPON FOUNDATION

GEBCO 120 1903–2023

IHO International Hydrographic Organization

unesco Intergovernmental Oceanographic Commission

University of New Hampshire

Lamont-Doherty Earth Observatory
COLUMBIA UNIVERSITY | EARTH INSTITUTE

National Oceanography Centre

AWI ALFRED-WEGENER-INSTITUT HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

Stockholm University

NIWA Taihoro Nukurangi

GNS SCIENCE

Land Information New Zealand

THE NIPPON FOUNDATION-GEBCO
SEABED 2030

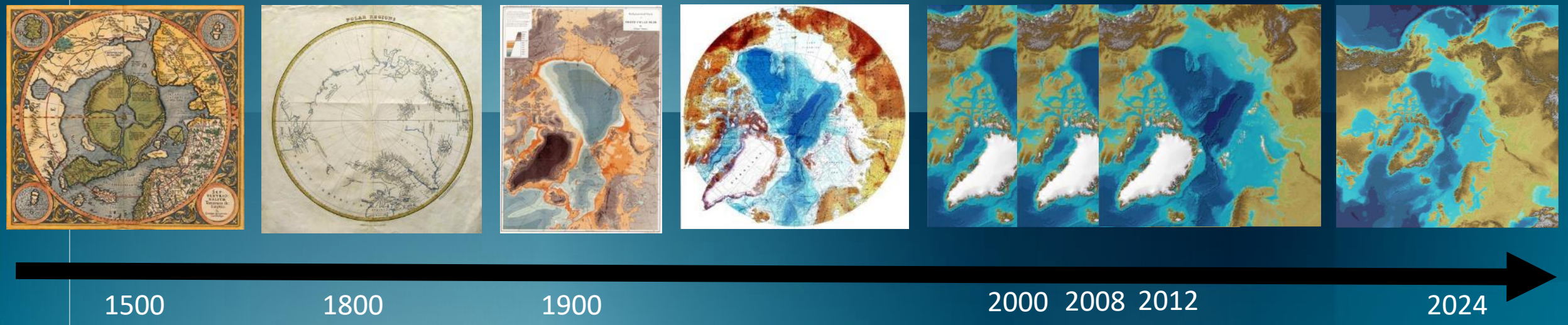
JULY 2023

IBCAO 5.0

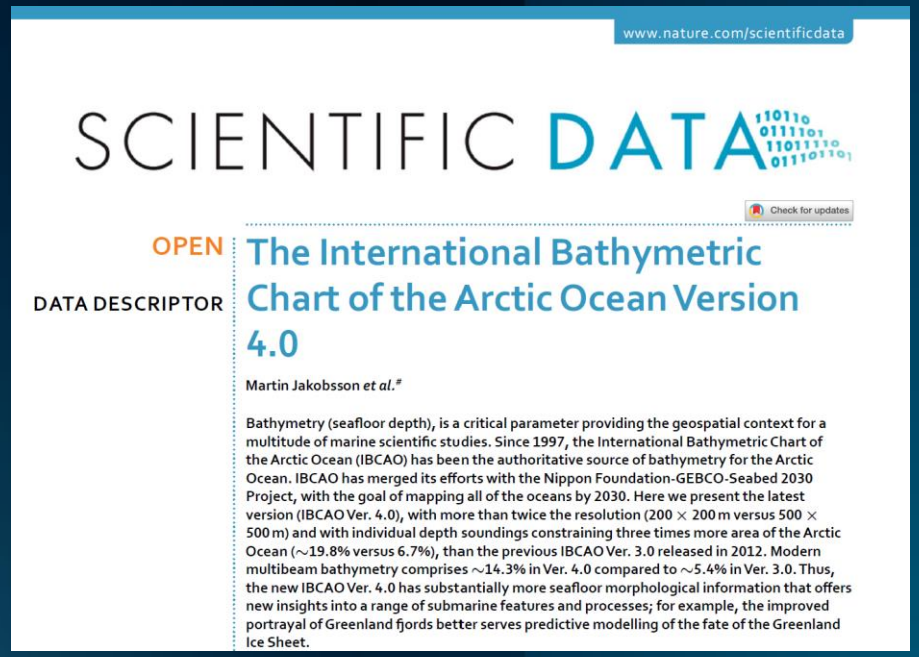
International Bathymetric Chart of the Arctic Ocean (IBCAO):

Initiated 1997 as an IOC International Bathymetric Chart (IBC)

Became part of GEBCO as a Regional Compilation



Last formal release: Version 4.0, released Summer 2020
Resolution: 200 x 200 m, Polar Stereographic Projection
Release article: *Nature Scientific Data*, 2020



www.nature.com/scientificdata

SCIENTIFIC DATA

Check for updates

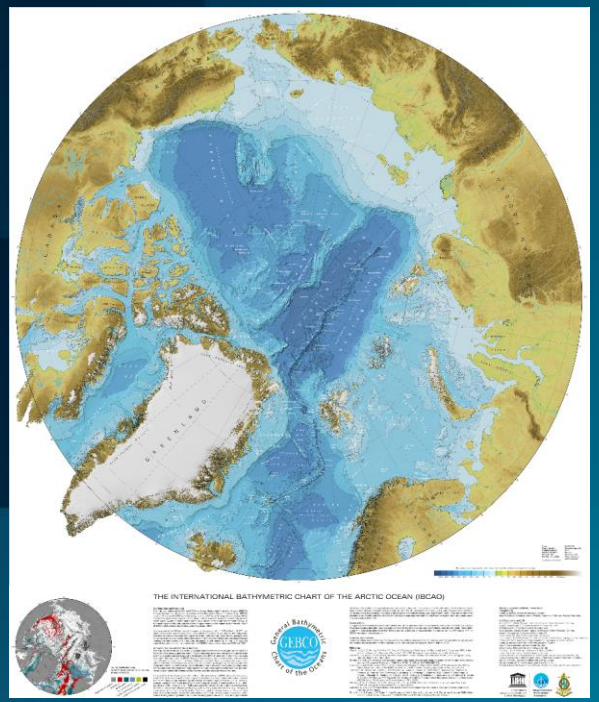
OPEN

DATA DESCRIPTOR

The International Bathymetric Chart of the Arctic Ocean Version 4.0

Martin Jakobsson *et al.*#

Bathymetry (seafloor depth), is a critical parameter providing the geospatial context for a multitude of marine scientific studies. Since 1997, the International Bathymetric Chart of the Arctic Ocean (IBCAO) has been the authoritative source of bathymetry for the Arctic Ocean. IBCAO has merged its efforts with the Nippon Foundation-GEBCO-Seabed 2030 Project, with the goal of mapping all of the oceans by 2030. Here we present the latest version (IBCAO Ver. 4.0), with more than twice the resolution (200 × 200 m versus 500 × 500 m) and with individual depth soundings constraining three times more area of the Arctic Ocean (~19.8% versus 6.7%), than the previous IBCAO Ver. 3.0 released in 2012. Modern multibeam bathymetry comprises ~14.3% in Ver. 4.0 compared to ~5.4% in Ver. 3.0. Thus, the new IBCAO Ver. 4.0 has substantially more seafloor morphological information that offers new insights into a range of submarine features and processes; for example, the improved portrayal of Greenland fjords better serves predictive modelling of the fate of the Greenland Ice Sheet.



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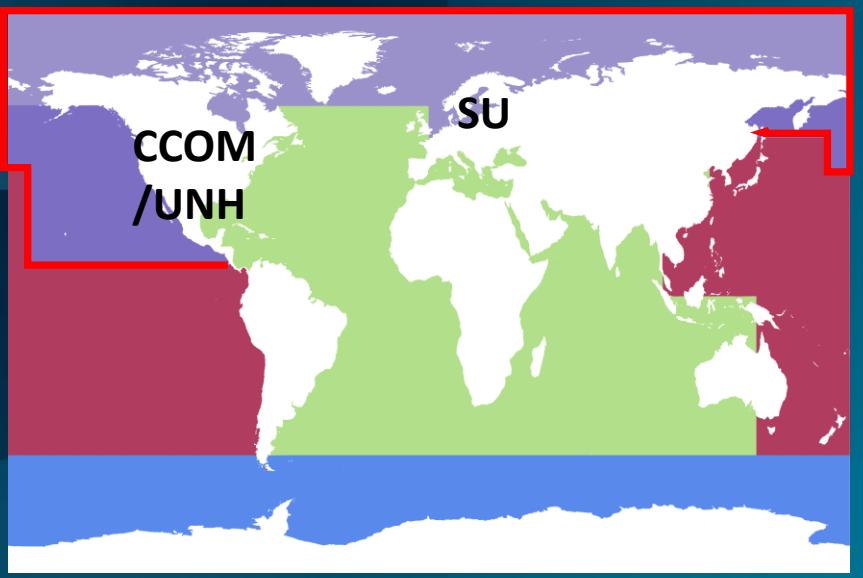


IBCAO 5.0

- **Completed in June 2024**
- **Main polar stereographic grid 100 x 100 m grid-cell size**
- **Paper submitted to Nature Scientific Data in July 2024 (under review)**

- Coordinated input from 70 co-authors

- **IBCAO 5.0 available from GEBCO web site:** https://www.gebco.net/data_and_products/gridded_bathymetry_data/arctic_ocean/

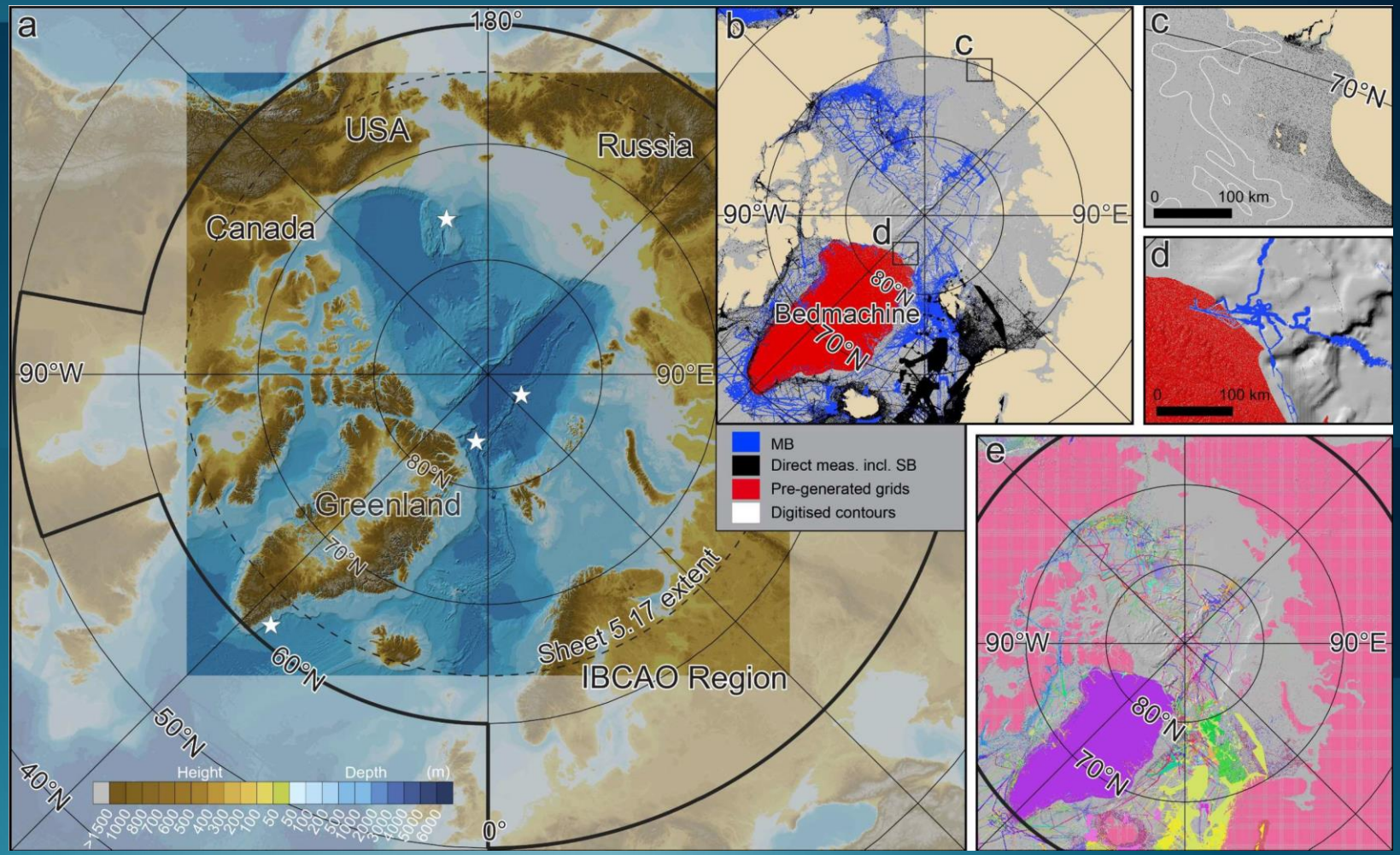
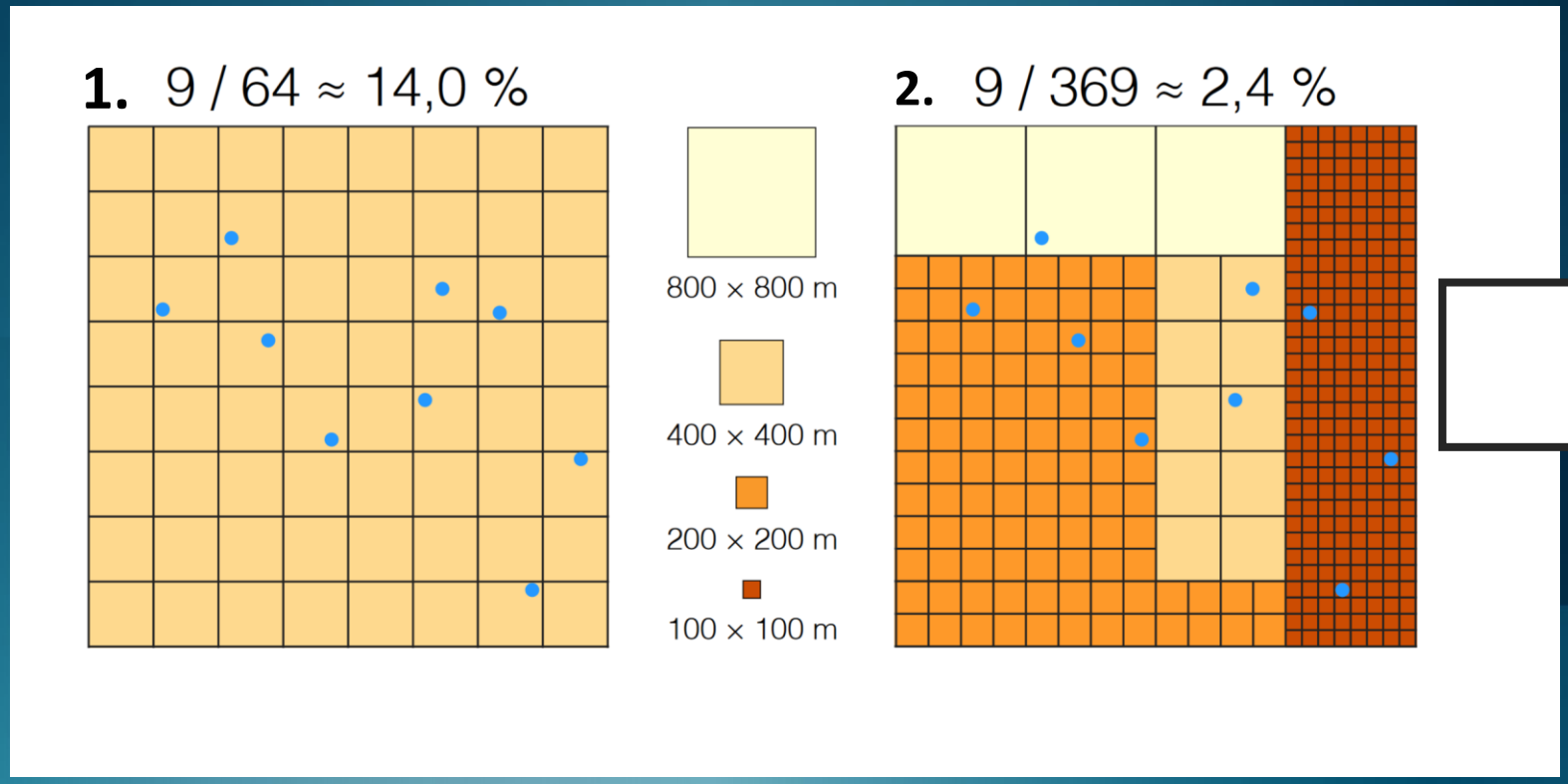


Figure 1 from submitted paper showing the IBCAO region, and Seabed 2030 Arctic region

Our calculations of mapping coverage account for the Seabed variable resolution scheme by depth

Several ways to calculate coverage

1. Just counting “mapped pixels” (will give different results for different grid resolutions)
2. Seabed resolutions and area-correct projection or geodetic



Employed by Seabed 2030/IBCAO

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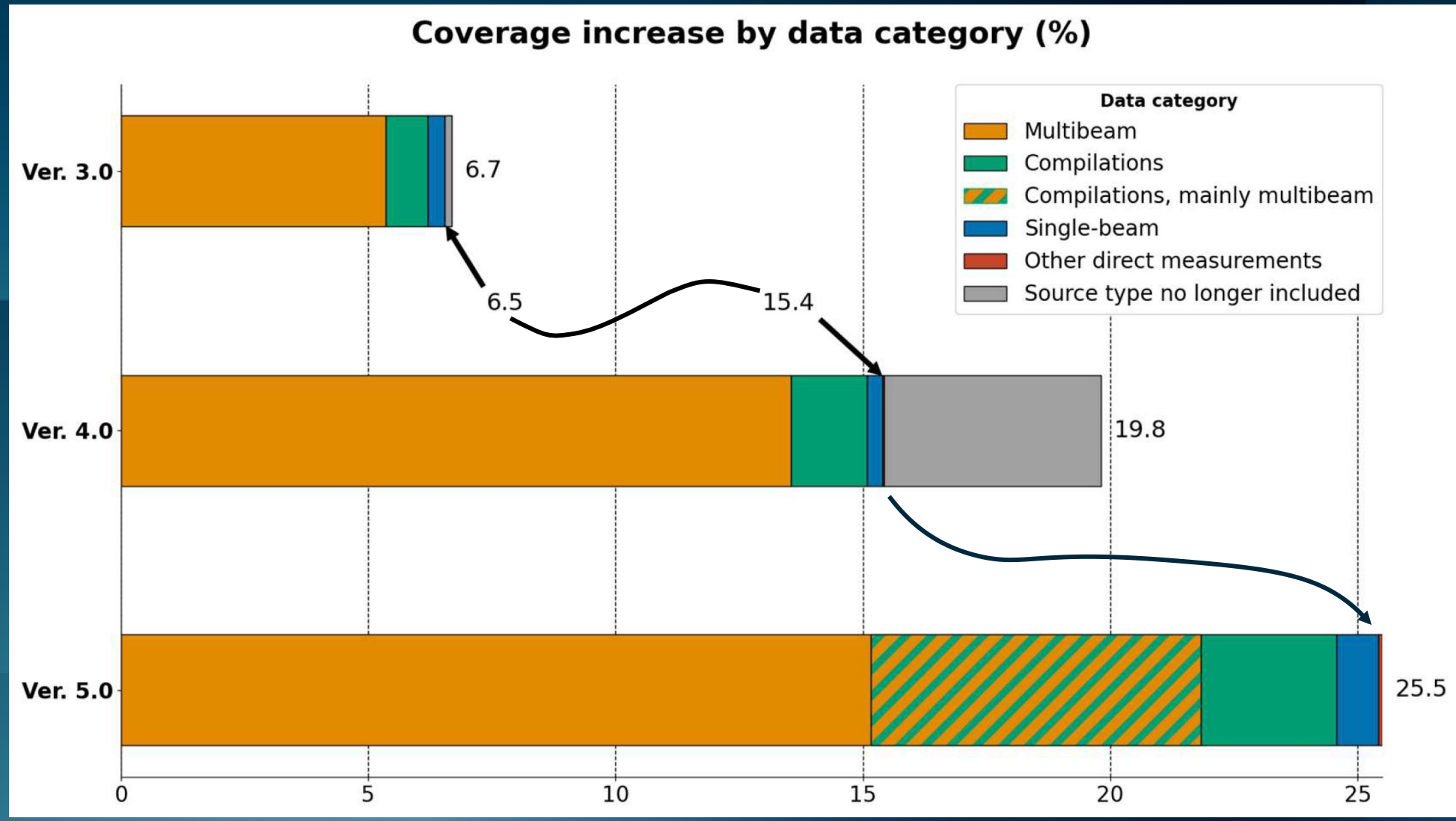
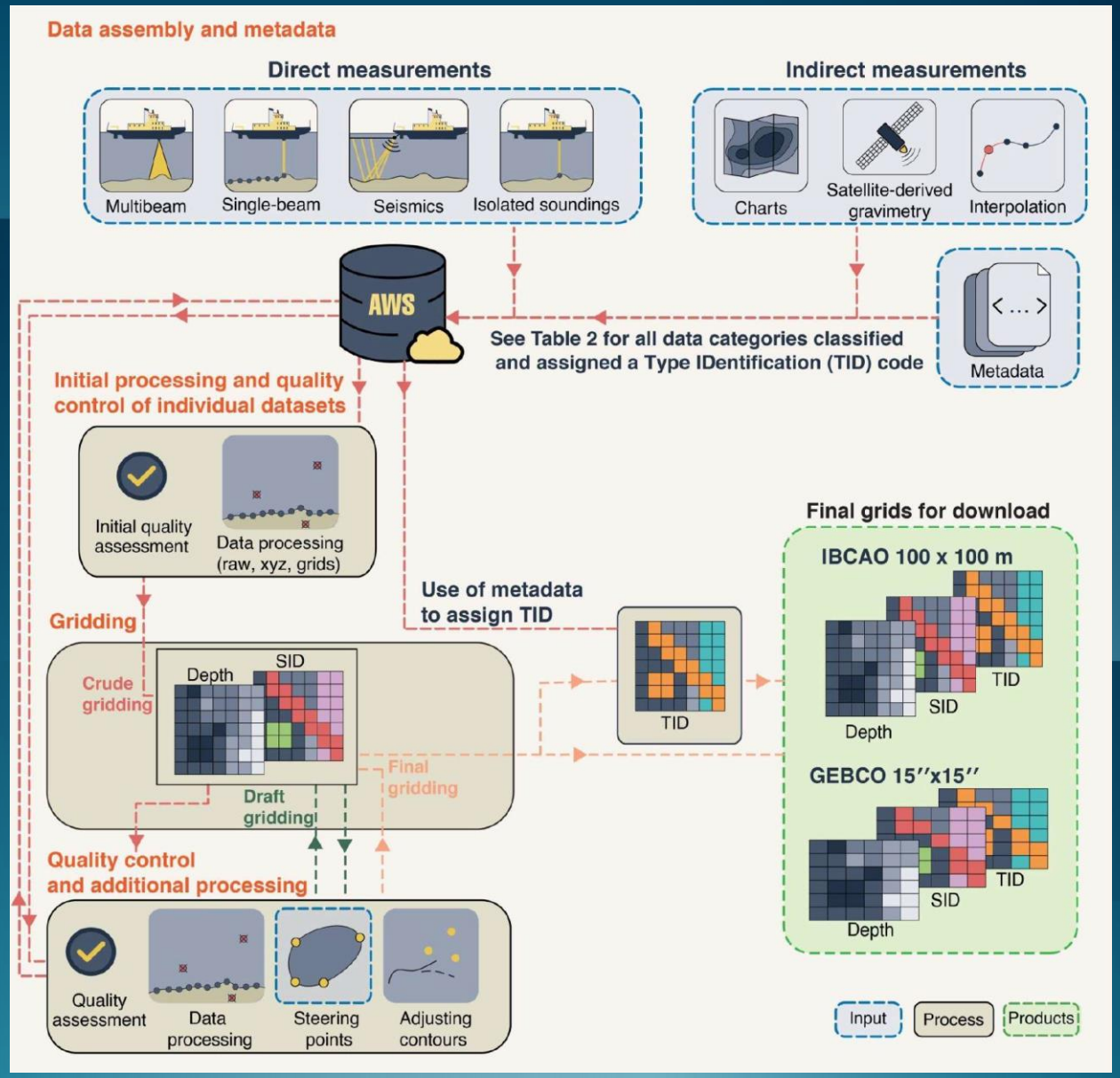


Comparison between the three main source data categories in IBCAO 3.0, 4.0 and 5.0. Note that the grey sections of the bars for IBCAO 3.0 and 4.0 represent source data types we no longer count when calculating mapping coverage. A large segment of the “compilations” data category is likely composed of multibeam measurements, although only a rough estimation is currently available.

New cloud computing compilation methods. Can grid the entire world, has been tested with >30 billion depth source points



Flow chart of the major steps involved in compiling the IBCAO 5.0 grid

AWS: Amazon Web Services
TID: Type Identification
SID: Source Identification

Crowdsourced Bathymetry

A benefit for all States

Evert Flier

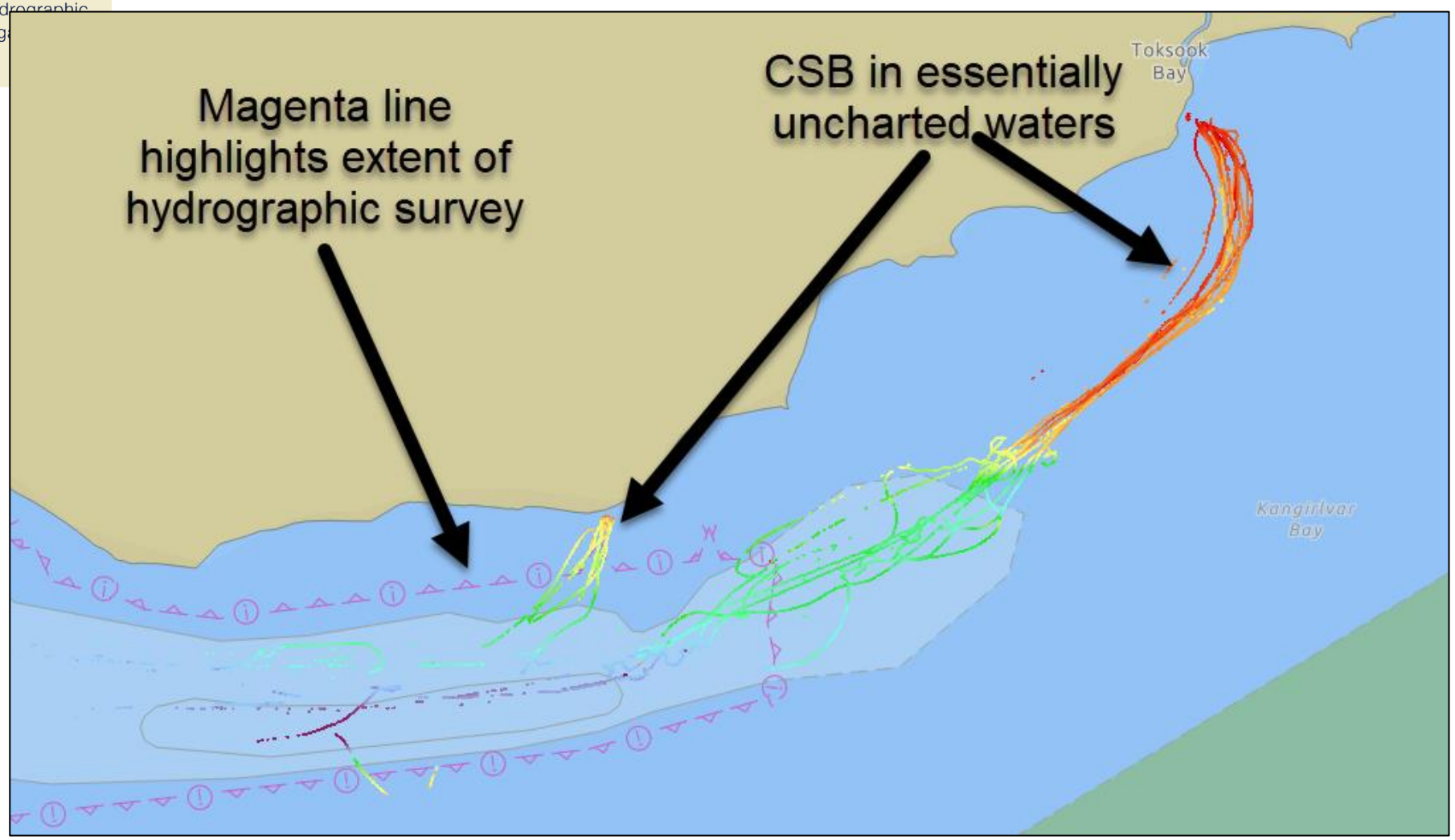
CSB/Seabed 2030 Coordinator

CSBWG Member

evert.flier@kartverket.no

The Value of CSB Data - *Fill gaps where data is scarce*

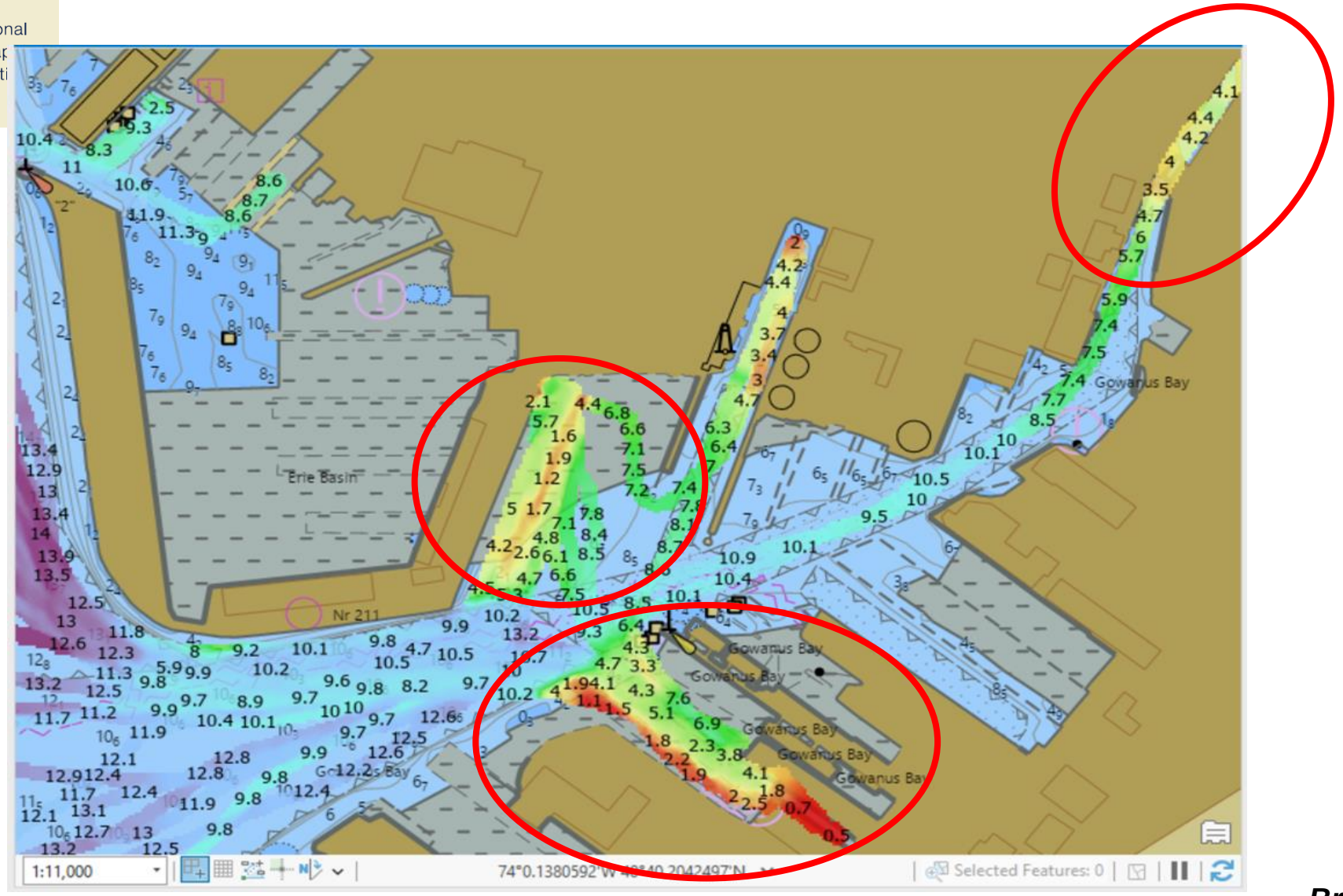
International Hydrographic Org



CSB tracks collected through and past the extent of a NOAA hydrographic survey in Toksook Bay, Alaska.

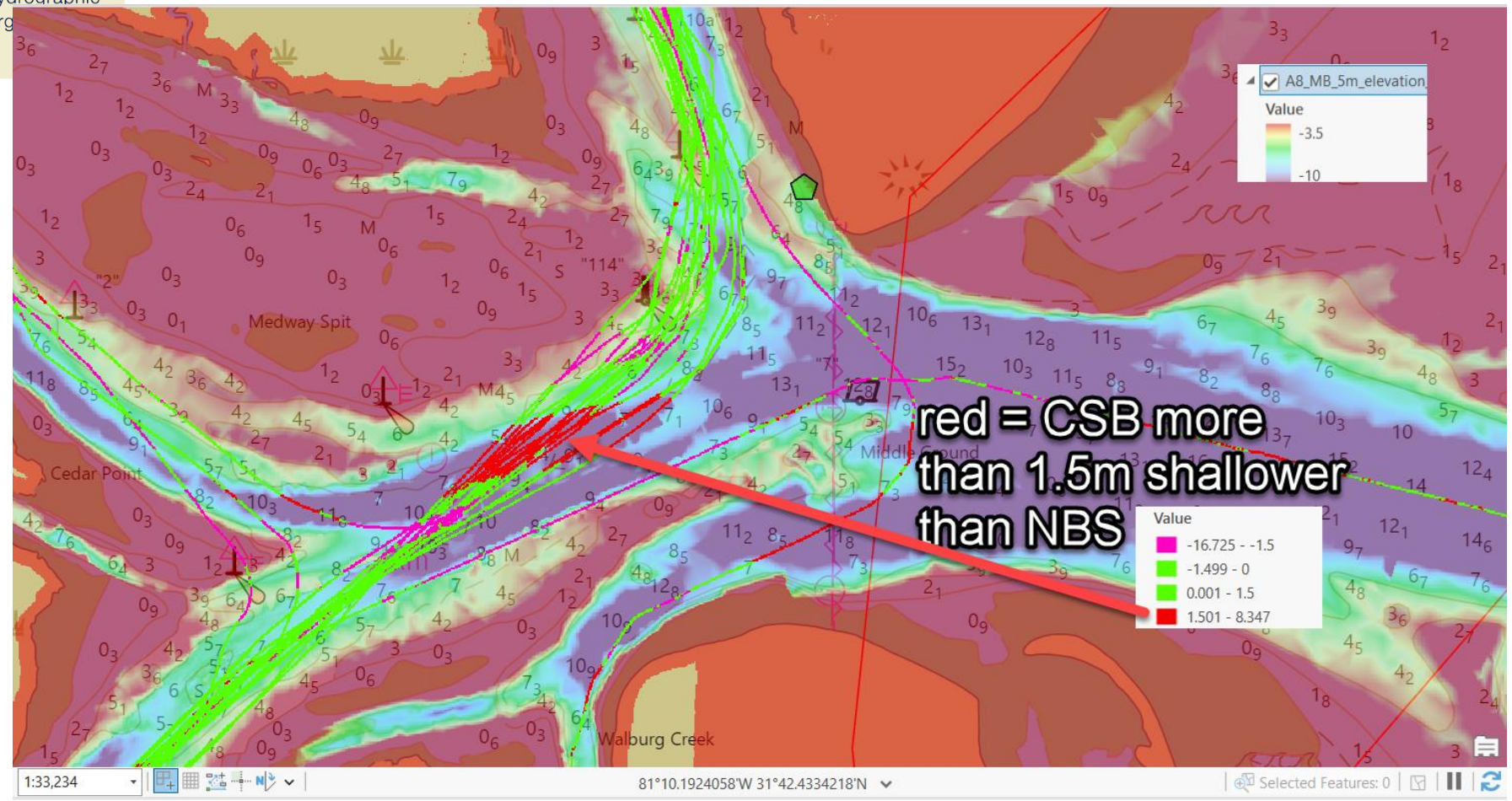
Credit: NOAA

The Value of CSB Data - *Fill gaps where mariners navigate*



Brooklyn New York; Credit: NOAA

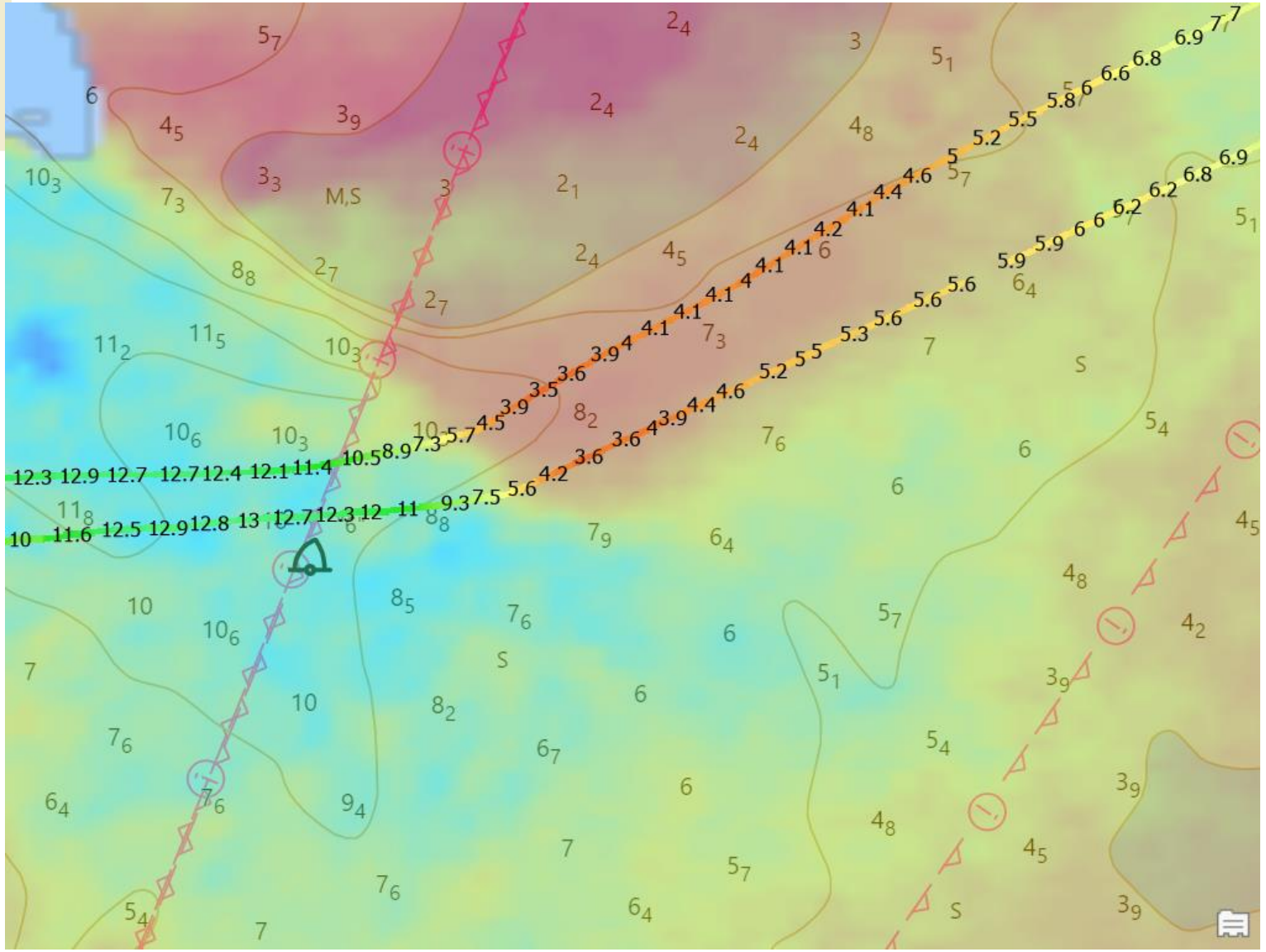
The Value of CSB Data - *Discrepancy Modelling*



Detecting coastal change over time and discrepancies in underlying bathymetric model.

St. Catherine Sound, Georgia; Credit: NOAA

The Value of CSB Data - *SDB correlation and ground truthing*



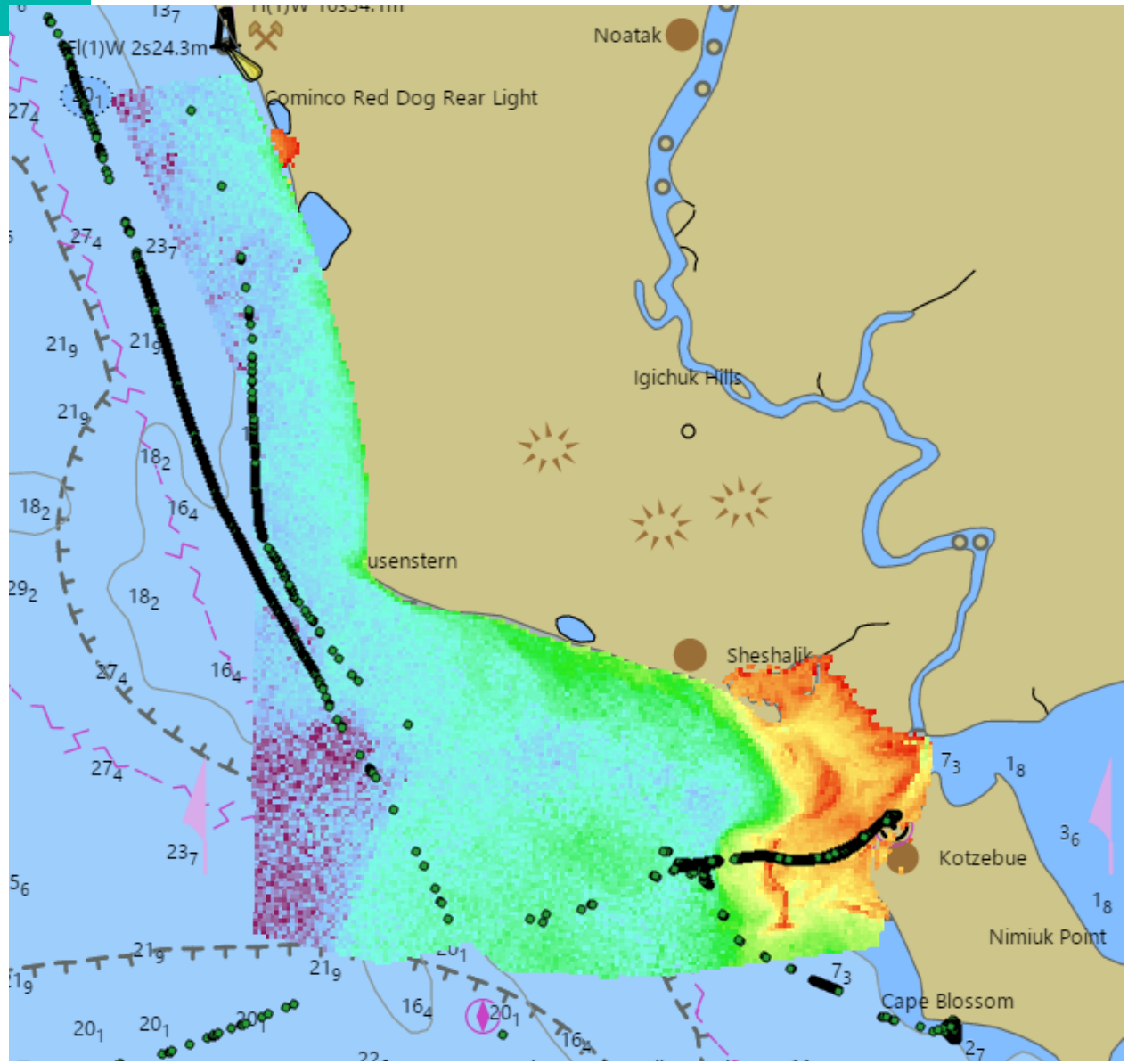
CSB detected and SDB confirmed shift of Nautilus Shoal in mouth of Chesapeake Bay

Credit: NOAA

IHO

International Hydrographic Organization

The Value of CSB Data - *SDB correlation and ground truthing*

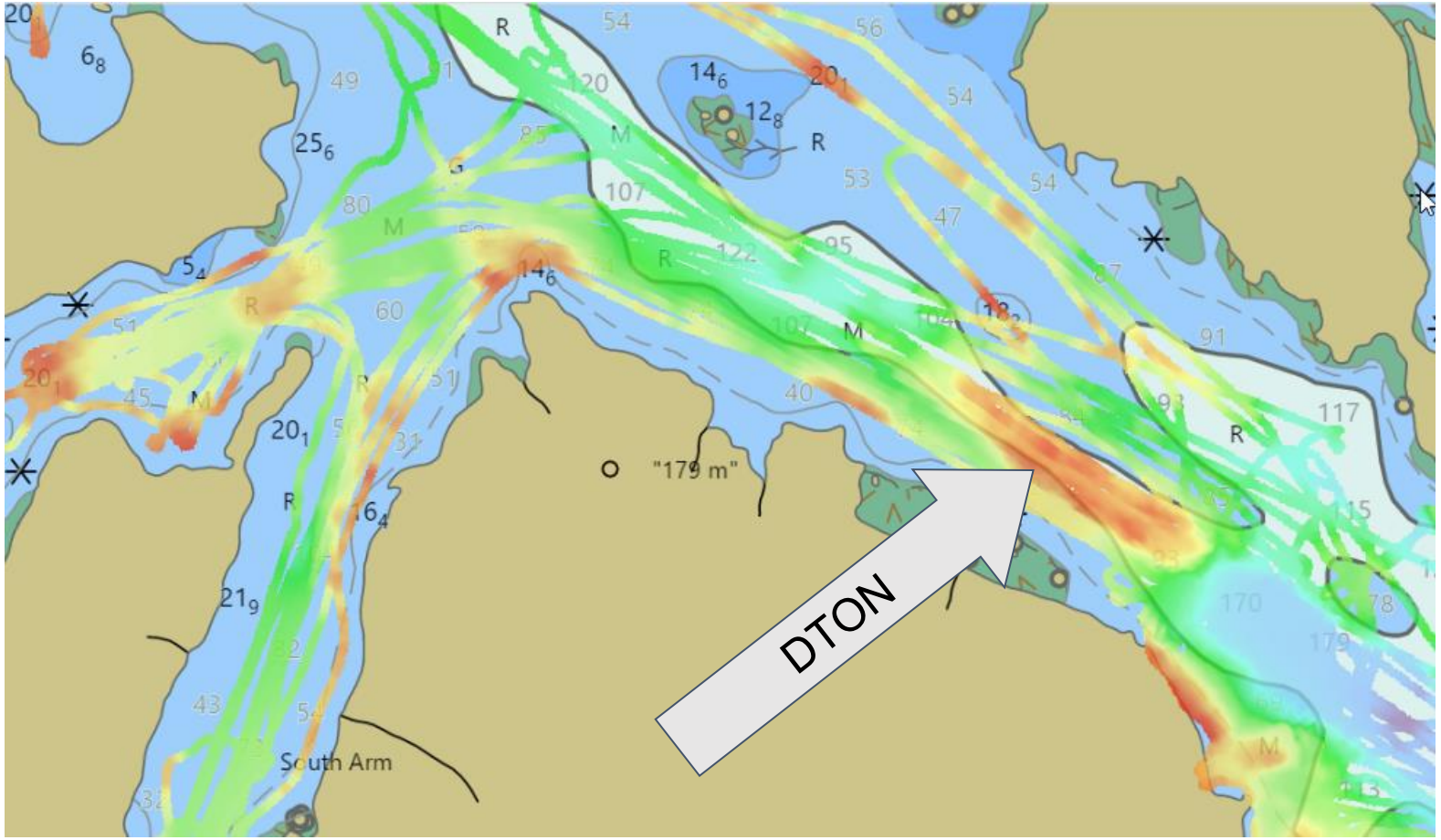


CSB used in analysis of Satellite-Derived Bathymetry Products in Remote Alaskan Arctic

Credit: NOAA

The Value of CSB Data - *Detect Dangers to Navigation before deploying field hydrographers*

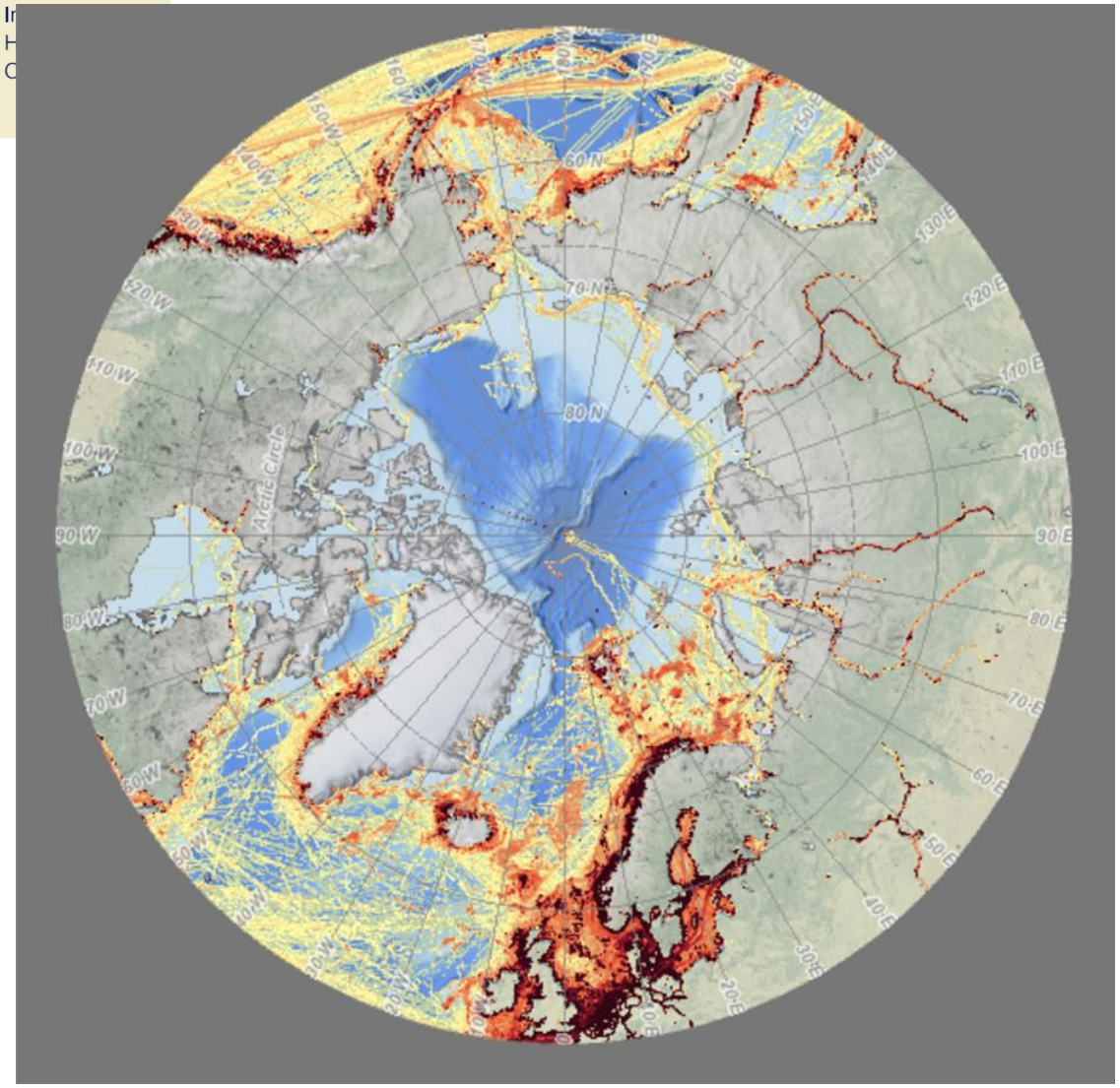
International Hydrographic Organization



Fairweather 2023 Dixon Entrance Project - CSB identified over half of field-submitted DTONs ahead of time

Credit: NOAA

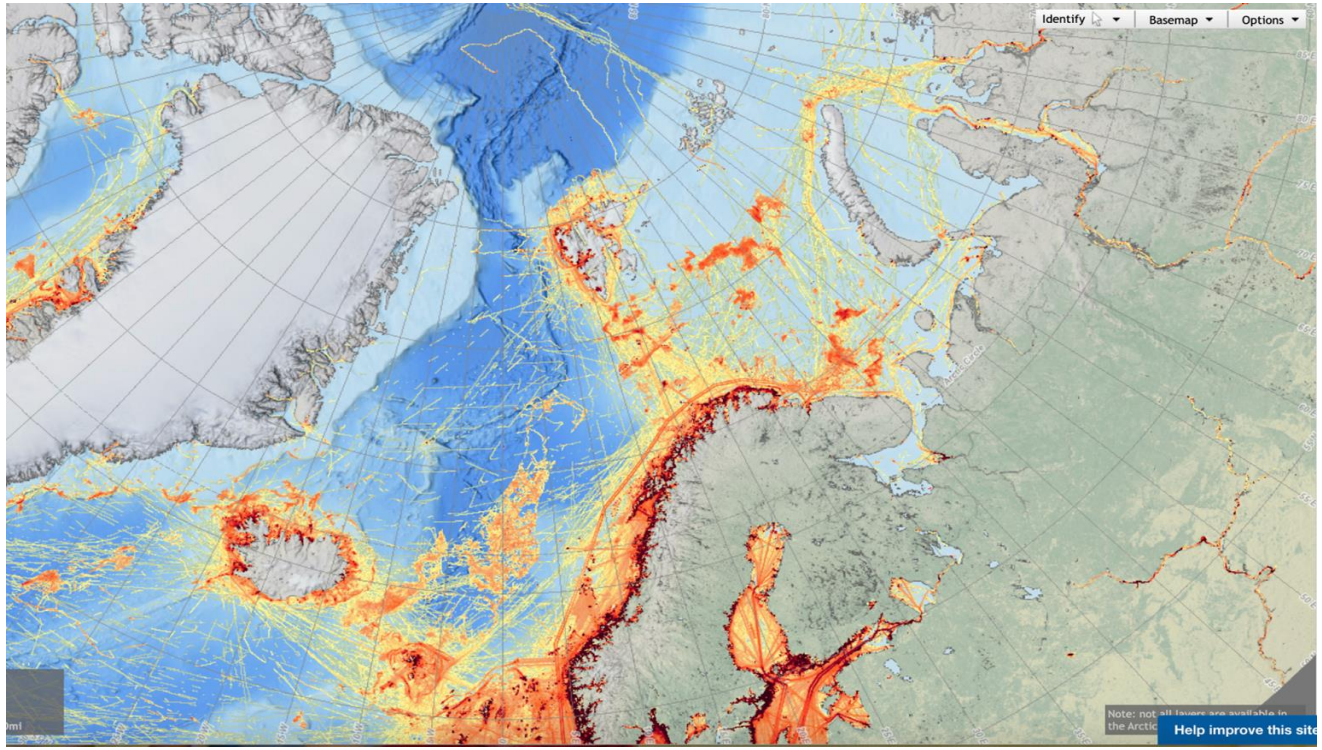
The Value of CSB Data - Could be SO much greater



Global Maritime Traffic Density Service (GMTDS)

The available CSB data is extremely small compared to available AIS data.

The ARHC should actively support the adoption, contribution, publicization, and use of CSB data within this region.



International Hydrographic Organization

CSB TOOLS WORKSHOP

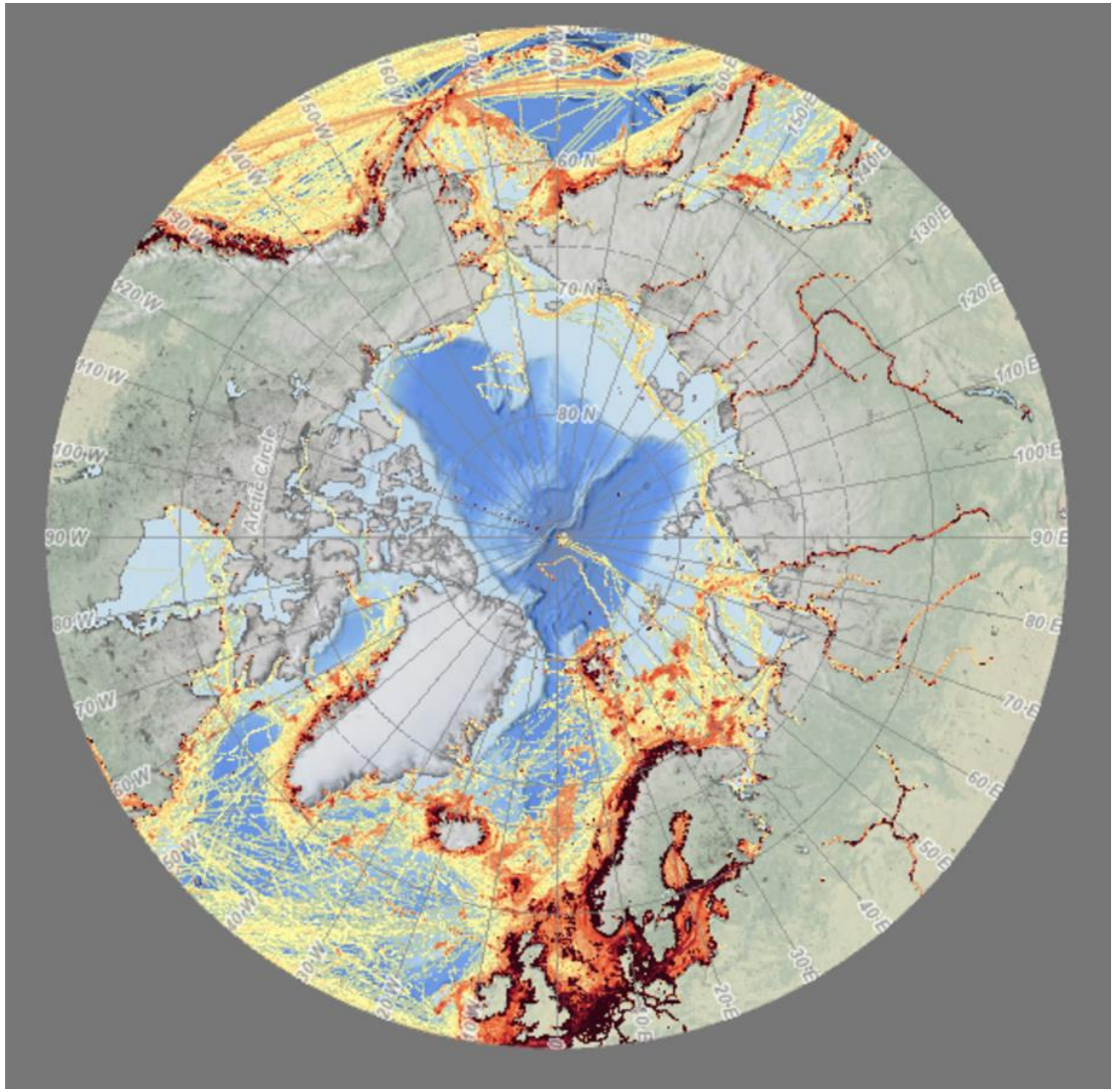
24-25 March 2025
(preceding CSBWG16)

The CSBWG will host a workshop where participants could learn about and see examples on how to use available CSB tools from all aspects of the CSB data cycle. Developers would provide assistance with first attempts to use these tools while also gathering user feedback.

All Hydrographic Offices are encouraged to participate & attend.

The ARHC is requested to:

- Note this presentation
- Actively support the adoption, contribution, publicization, and use of CSB data within this region
- Follow the latest developments of the CSBWG
- Connect with your RHC CSB/Seabed2030 Coordinator
- Take ownership of these data and their potential uses!



Global Maritime Traffic Density Service (GMTDS)

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

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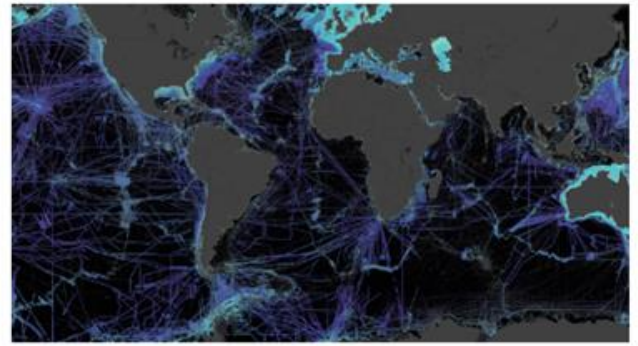
IHO Data Centre for Digital Bathymetry (DCDB)

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.

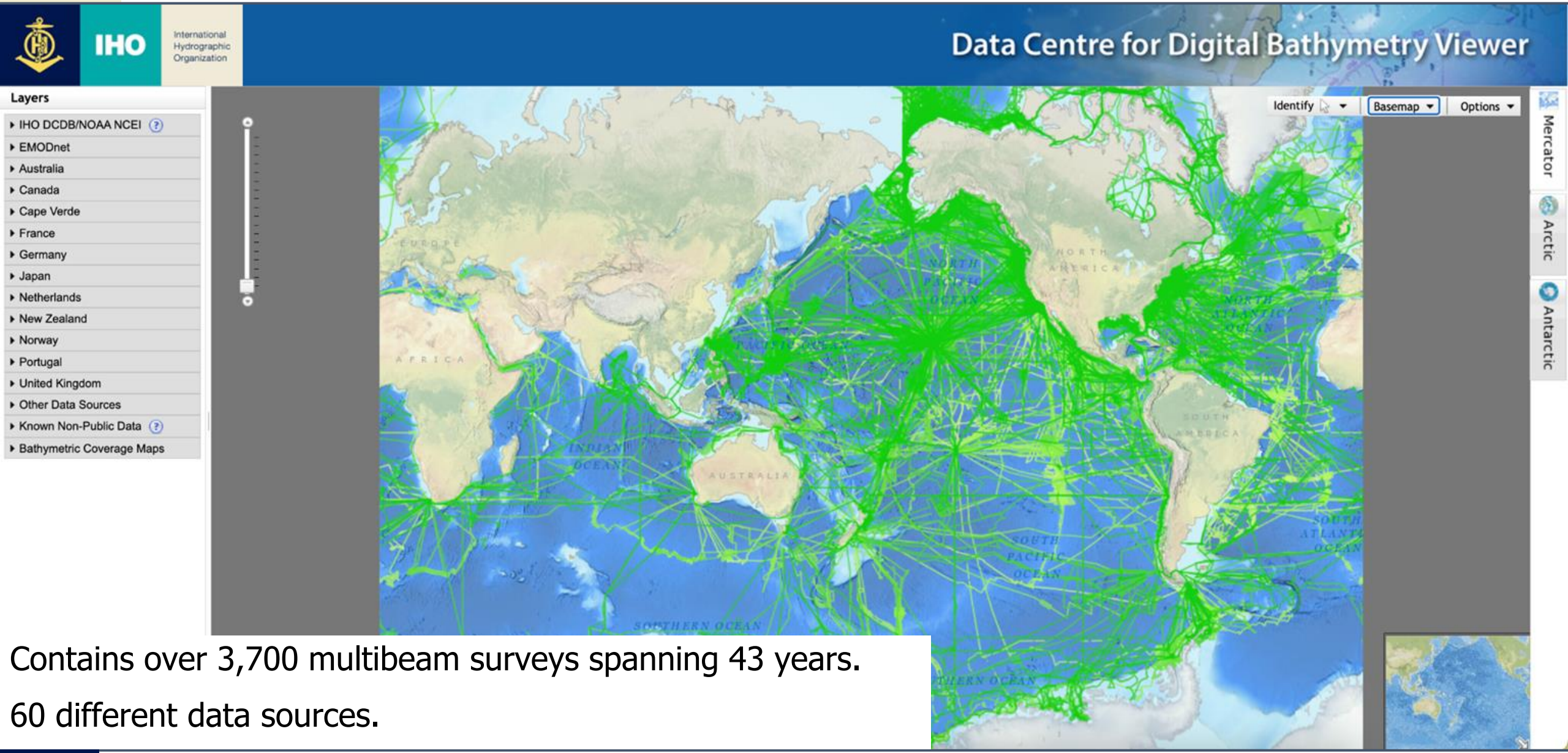


25% of the deep ocean floor has been mapped with direct measurement and approximately 50% of the world's coastal waters remain unsurveyed. (Source: GEBCO)

About Multi/Singlebeam Bathymetry Crowdsourced Bathymetry

The World Reference for Raw Bathymetry

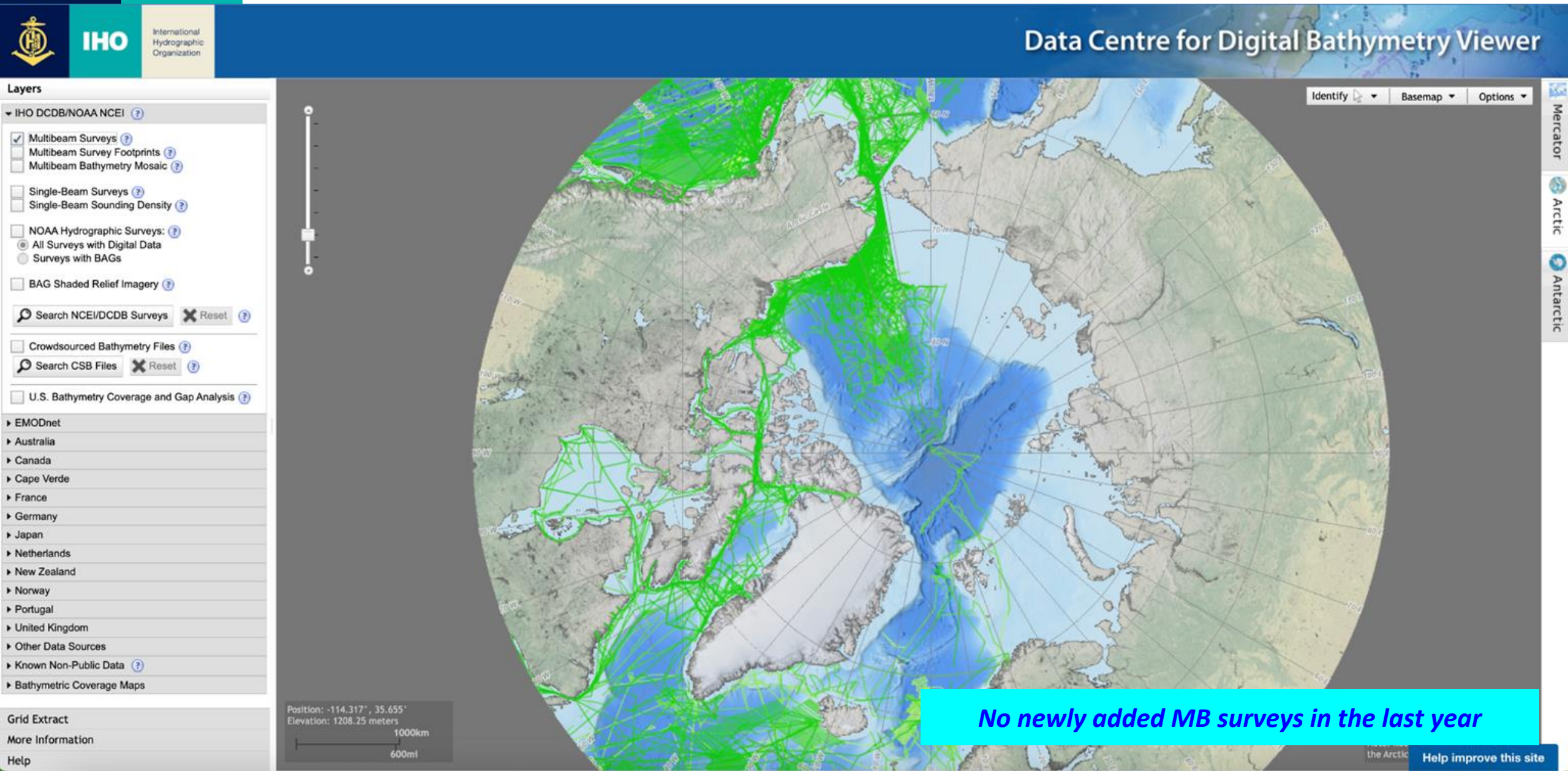
ncei.noaa.gov/maps/iho_dcdb/



Contains over 3,700 multibeam surveys spanning 43 years.

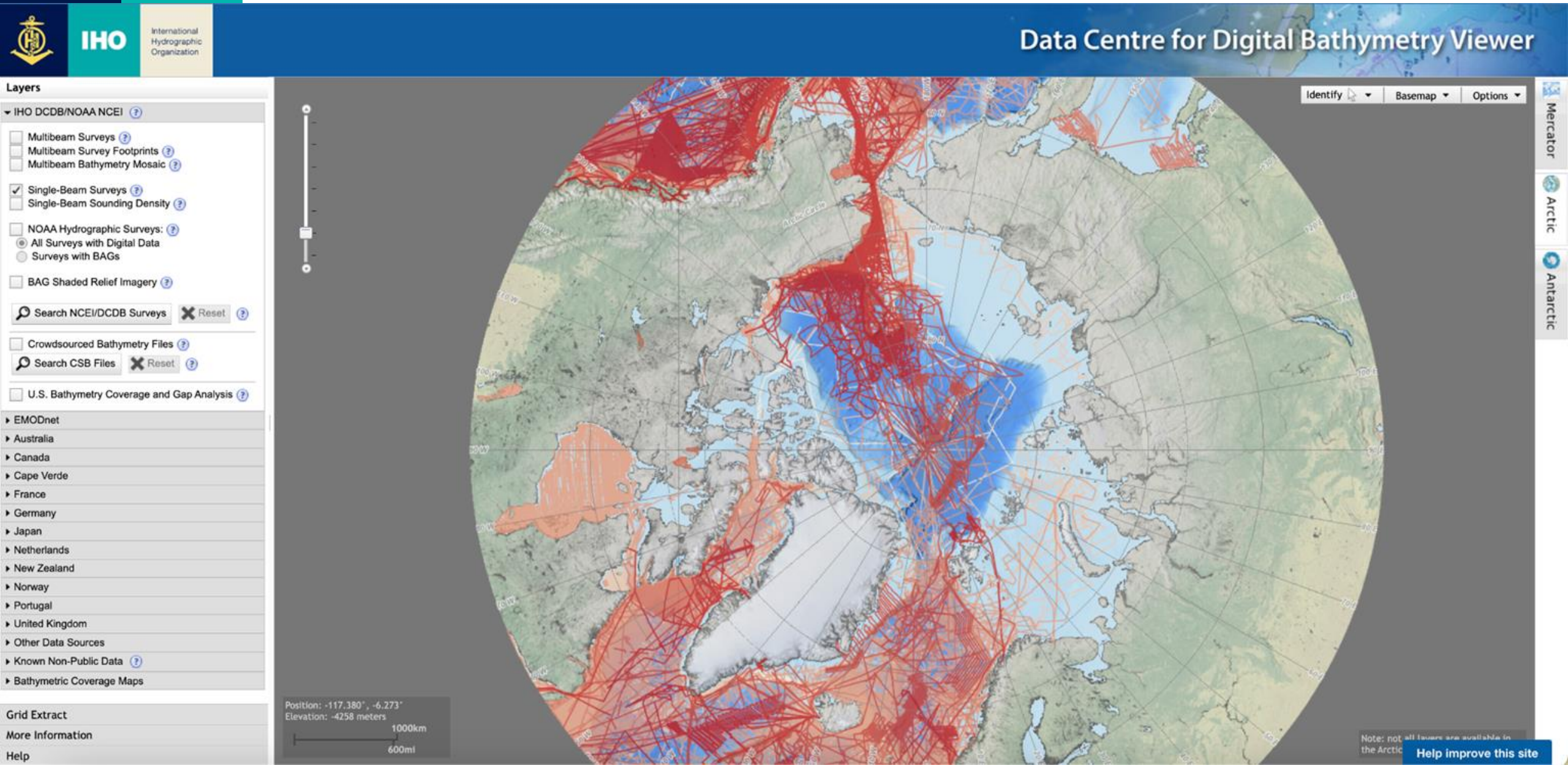
60 different data sources.

DCDB Data Holdings - Multibeam

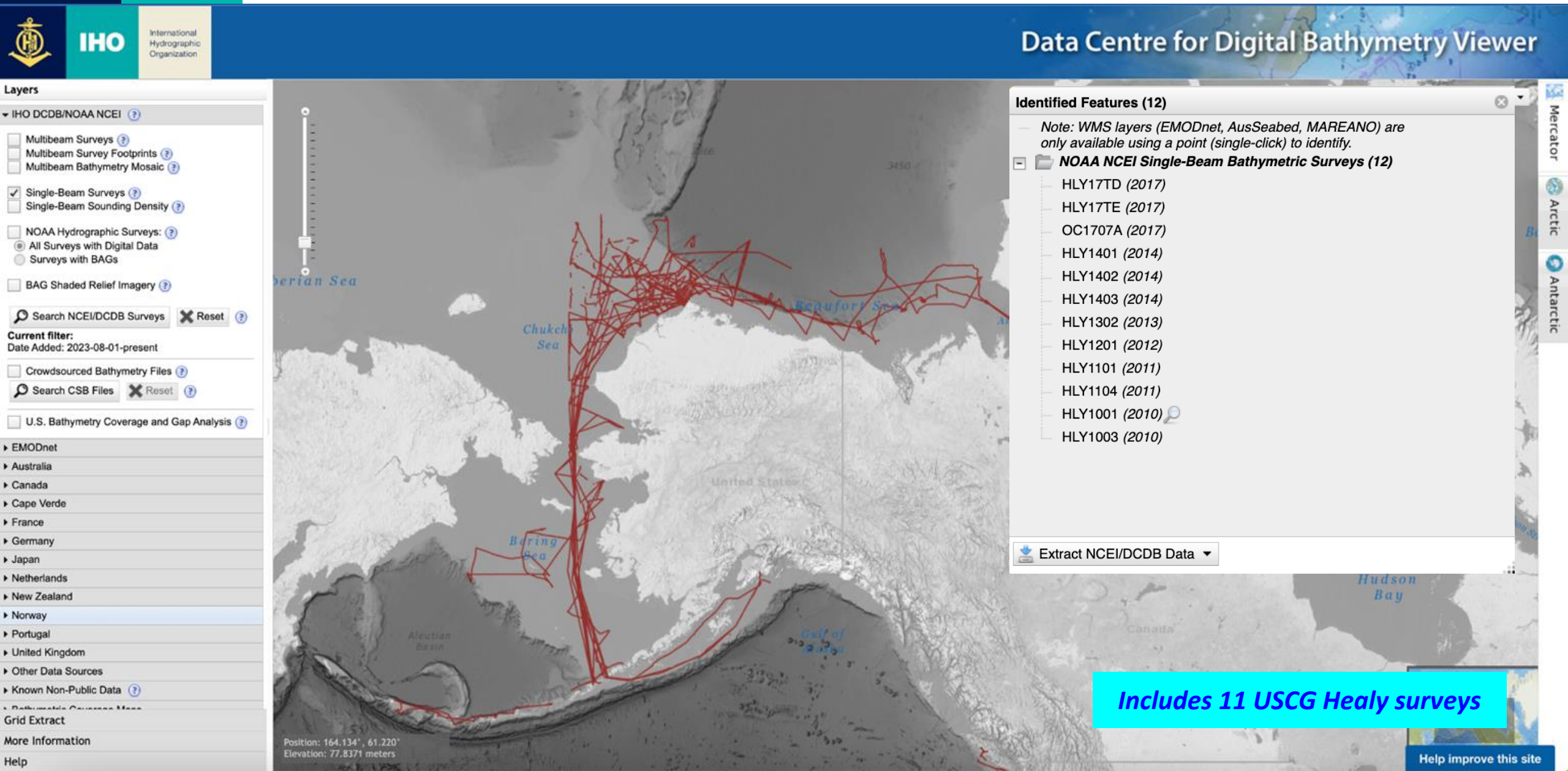


No newly added MB surveys in the last year

DCDB Data Holdings - Singlebeam

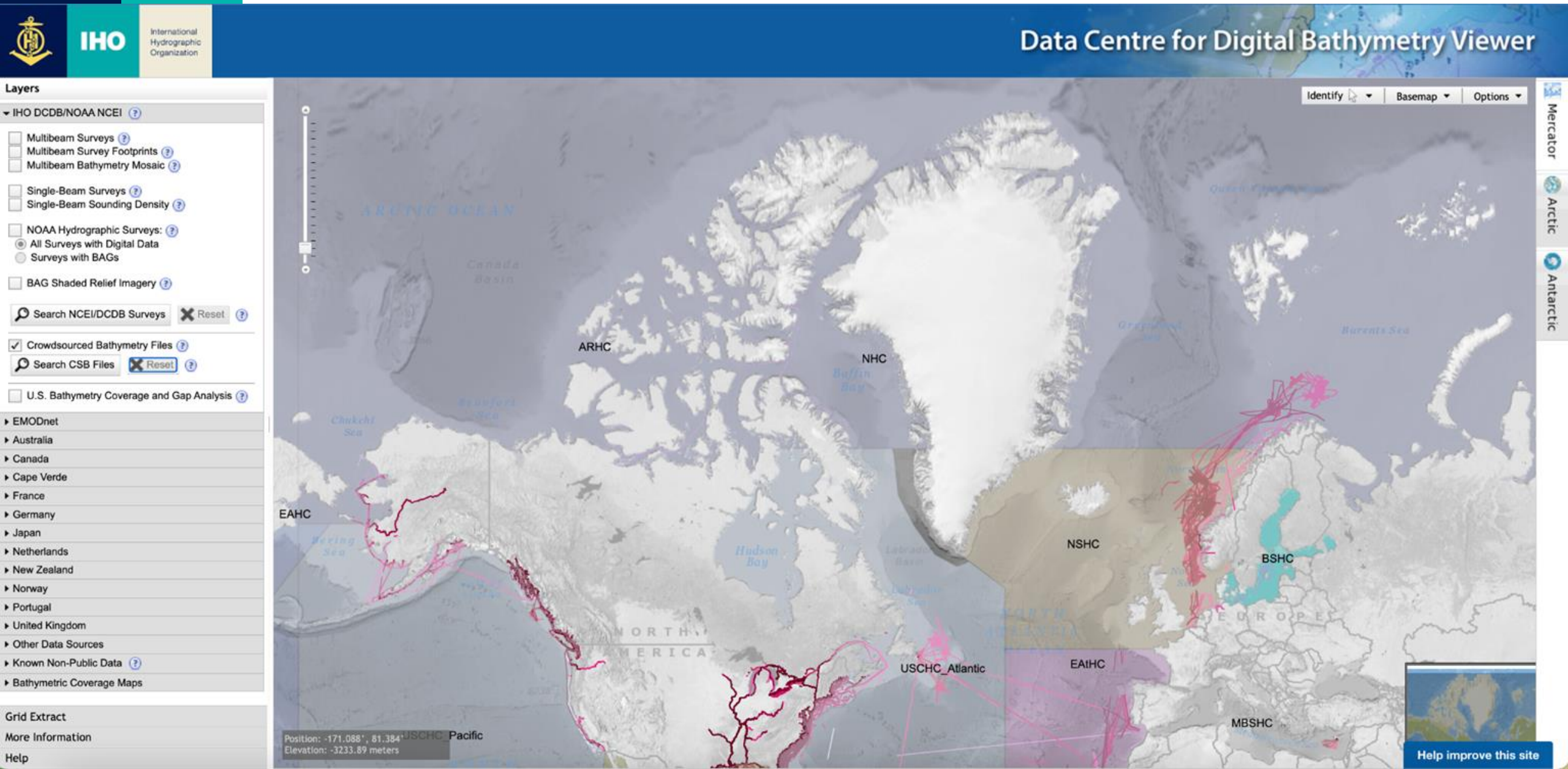


DCDB Data Holdings - NEW Singlebeam

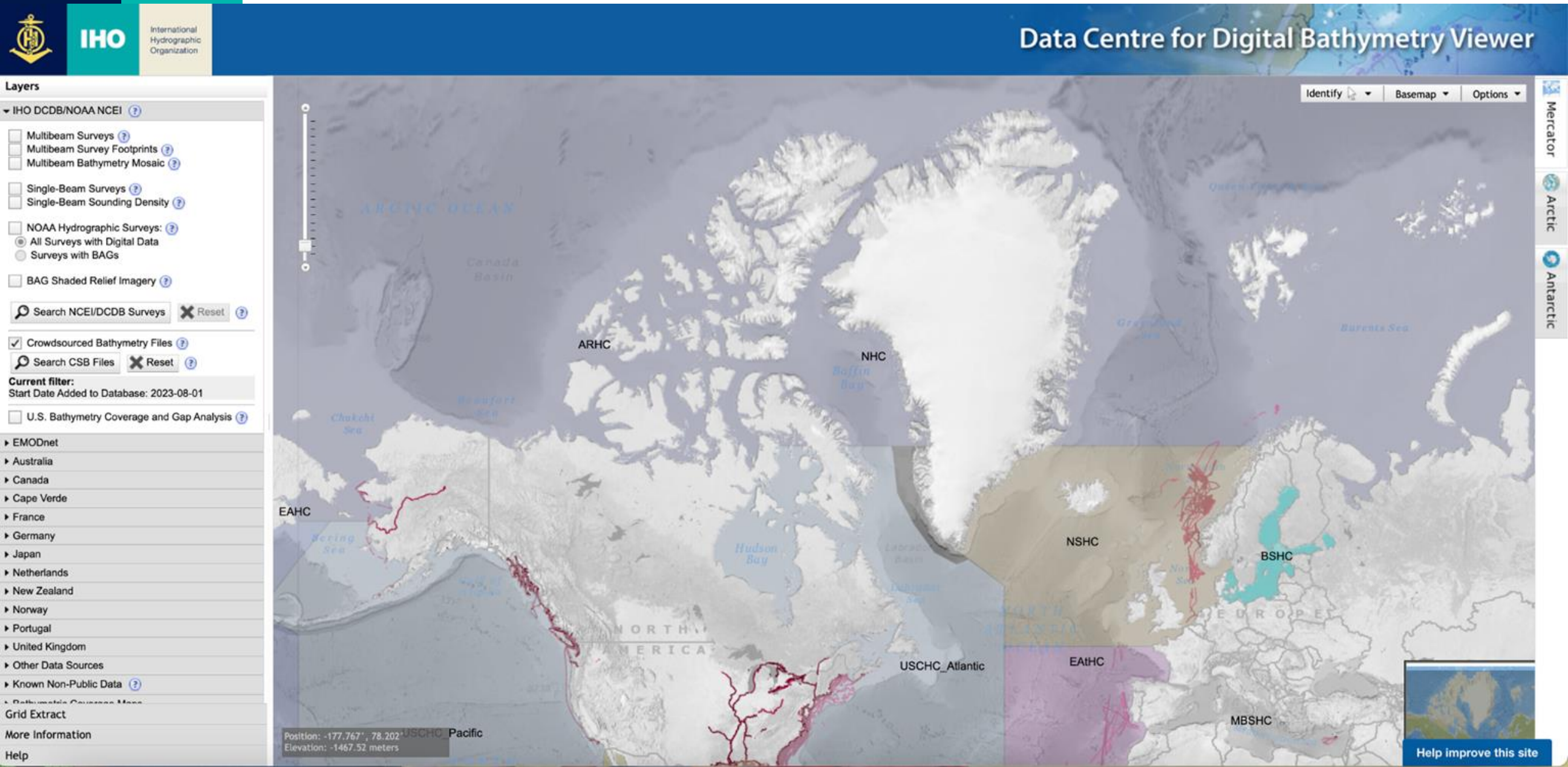


Includes 11 USCG Healy surveys

DCDB Data Holdings - Crowdsourced Bathymetry

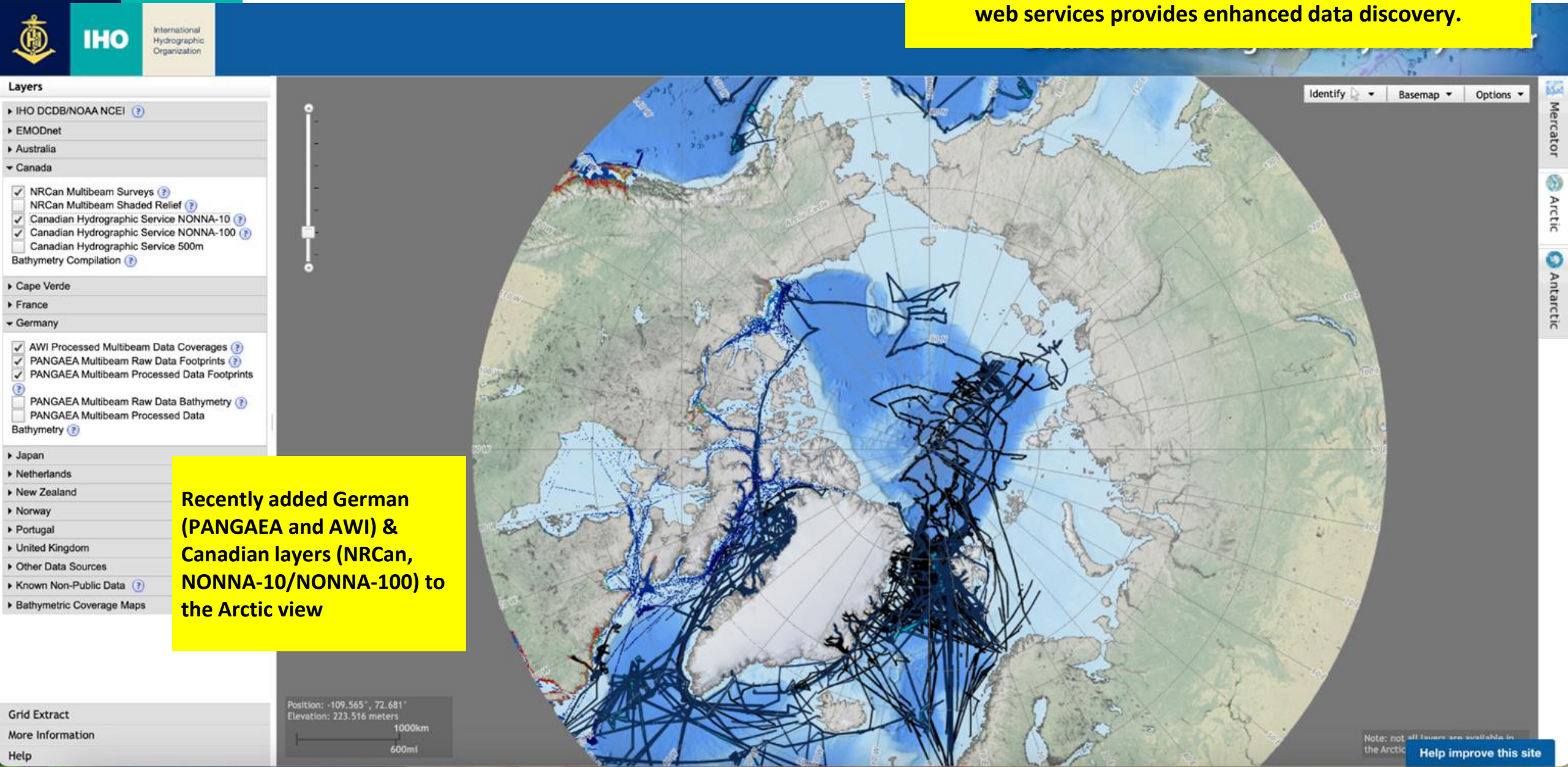


DCDB Data Holdings - NEW Crowdsourced Bathymetry



DCDB Web Services

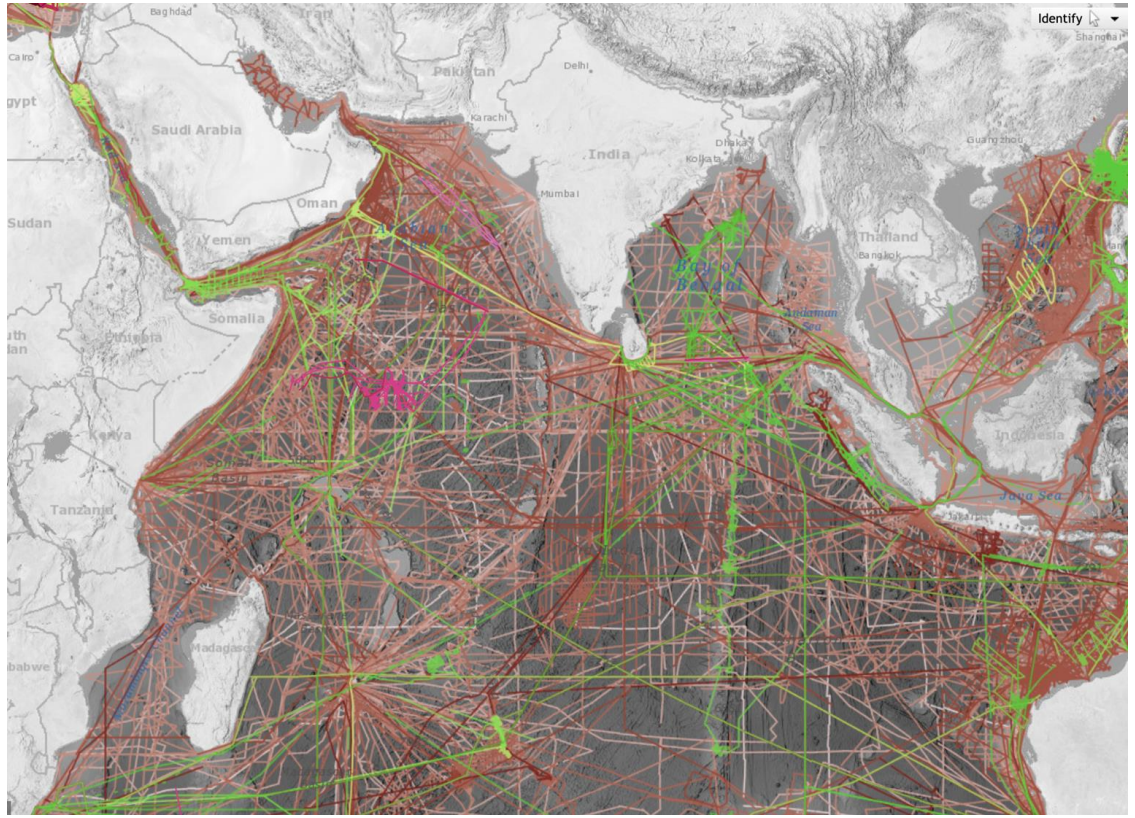
Spatial extent of data archived at other repositories via web services provides enhanced data discovery.



Recently added German (PANGAEA and AWI) & Canadian layers (NRCan, NONNA-10/NONNA-100) to the Arctic view

ARHC Members are reminded to:

- Contact the DCDB if issues arise when attempting to discover or access data
- Consider sharing data to the DCDB
- Consider building and/or including your web services in the DCDB viewer



ncei.noaa.gov/maps/iho_dcdb/

jennifer.jencks@noaa.gov