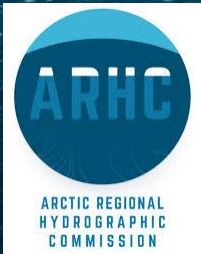


# Hydrography in the Arctic- A Brief to the ASBPIF-2020

**RDML Shepard Smith (USA), Director  
NOAA Office of Coast Survey  
Chair, Arctic Regional Hydrographic  
Commission**

**November 24, 2020**



**IHO**

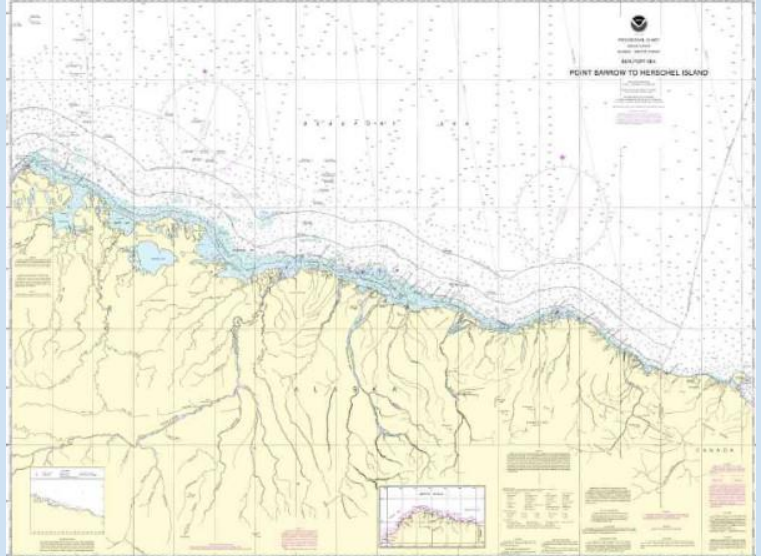
# Who am I? Why am I here?

- NOAA Coast Survey
  - National Hydrographic Office for the USA-we do surveys and make the charts for all US, fulfilling key parts of the SOLAS convention
  - Represent the US to the IHO – global standards and coordination body,
- Arctic Regional Hydrographic Commission
  - One of 16 regions that coordinate hydrographic services
  - ARHC Focus in on improving hydrographic services in the Arctic through risk management and innovative new technology



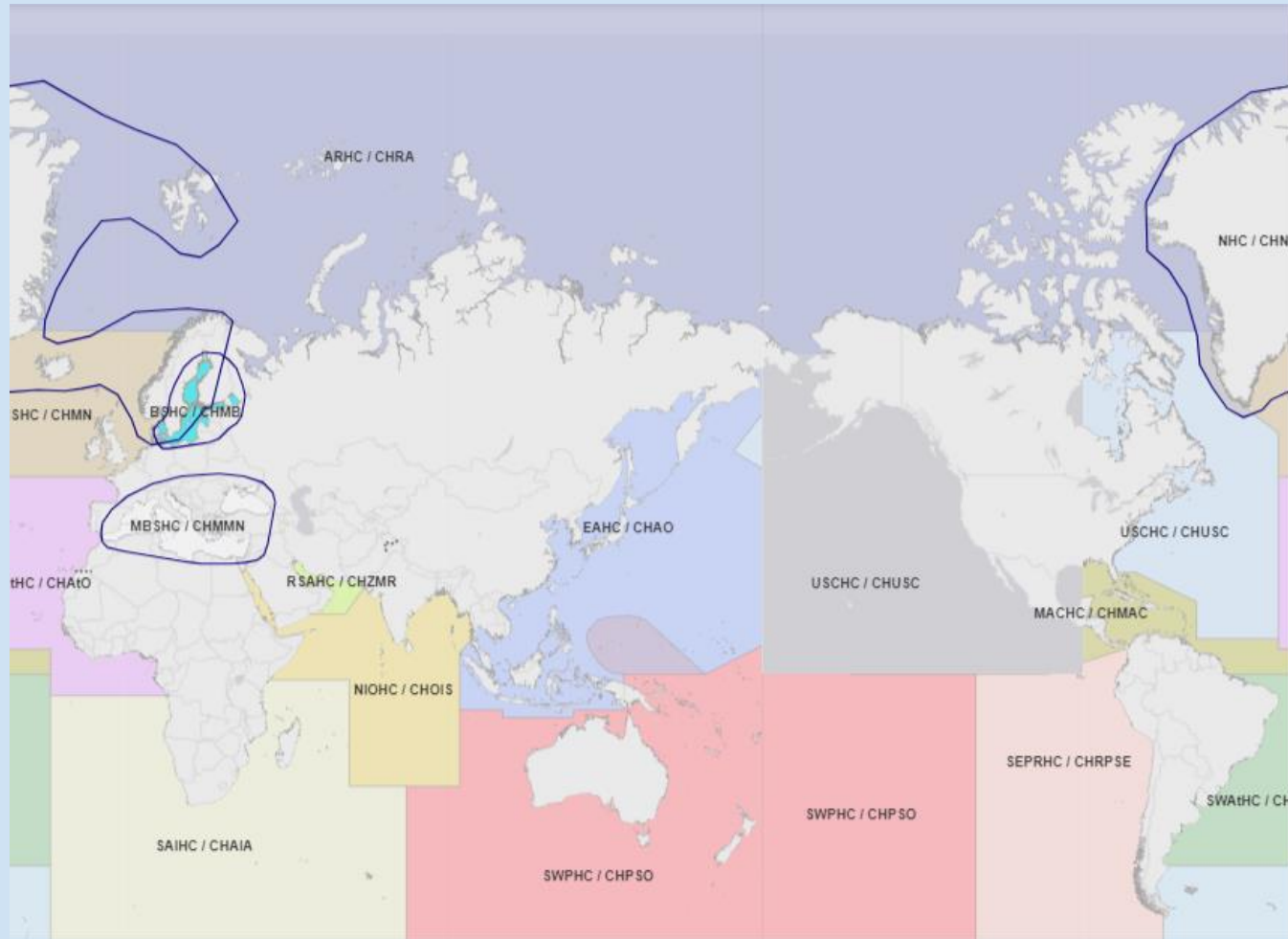


# navigation in the Arctic- exploration, discovery, & promise,



Building a new situational awareness  
of the environment for navigating  
safely and utilizing the oceans...

# Reference



# Safety and risk – may not be what you think

- Communicating risk – the charts aren't as complete as you may think
  - "...substantial areas still rely on limited, outdated, or insufficient depth and other data..."
  - "Navigating outside areas supported by modern or adequately surveyed data...can result in the loss of human life and severe damage to property and the environment."
  - Electronic charts are still based on the same limited information.



## CAUTION REQUIRED WHEN USING NAUTICAL CHARTS OF ARCTIC WATERS

28 June 2017

As members or associate members of the Arctic Regional Hydrographic Commission (ARHC) and as Member States of the International Hydrographic Organization (IHO), the government Hydrographic Offices of Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, and the United States of America wish to highlight the significant limitations and risks associated with marine navigation in the Arctic.

While official nautical charts are produced by government hydrographic offices and are based on the latest information available, substantial areas still rely on limited, outdated, or insufficient depth and other data.

Due to the significant limitations of Arctic charting, all mariners in Arctic waters are required to plan well in advance of any prospective voyages, to understand their environment, and to exercise extreme caution when on the water, in order to minimize the associated high levels of risk. Caution is equally essential when navigating with Electronic Navigational Charts (ENC), as these official digital charts are based on the same limited or insufficient data as the official paper or electronic equivalent charts.

Navigating outside areas supported by modern or adequately surveyed data, and without advanced and comprehensive voyage planning, ice experience, knowledge, and precautions, can result in the loss of human life and severe damage to property and the environment.

To fulfill the relevant requirements of demonstrating that they have recognized and mitigated the risks, as well as exercised due diligence in the operation of their vessels, all mariners and ship operators should take note of the warnings set out here and in other references, including in the International Code for Ships Operating in Polar Waters (*The Polar Code*).

Interested readers are encouraged to contact the IHO Secretariat ([info@iho.int](mailto:info@iho.int)) or the Hydrographic Offices of the ARHC Member States with any comments or feedback, as part of the efforts of the Arctic hydrographic community to improve safety of navigation and operations in the region.

### **Further references:**

*The Polar Code:*

[http://www.iho.int/mtg\\_dscs/com\\_wg/NCWG/NCWG2/Polar%20Code.pdf](http://www.iho.int/mtg_dscs/com_wg/NCWG/NCWG2/Polar%20Code.pdf)

[http://www.iho.int/mtg\\_dscs/com\\_wg/NCWG/NCWG2-093\\_PolarCode\\_presentation\\_final.pdf](http://www.iho.int/mtg_dscs/com_wg/NCWG/NCWG2-093_PolarCode_presentation_final.pdf)

Arctic Regional Hydrographic Commission:

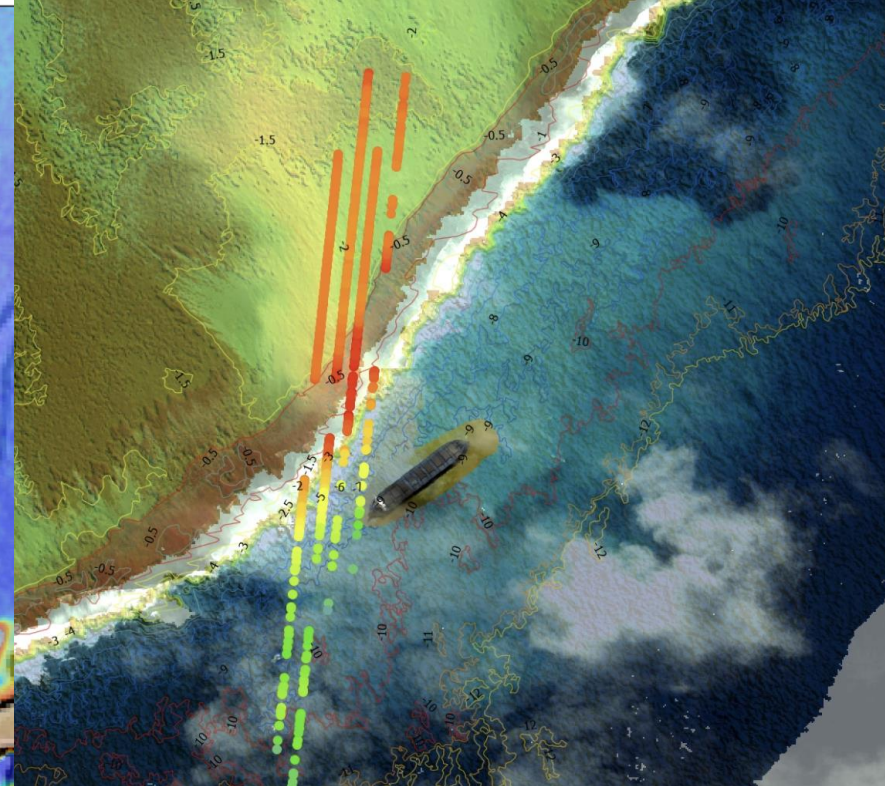
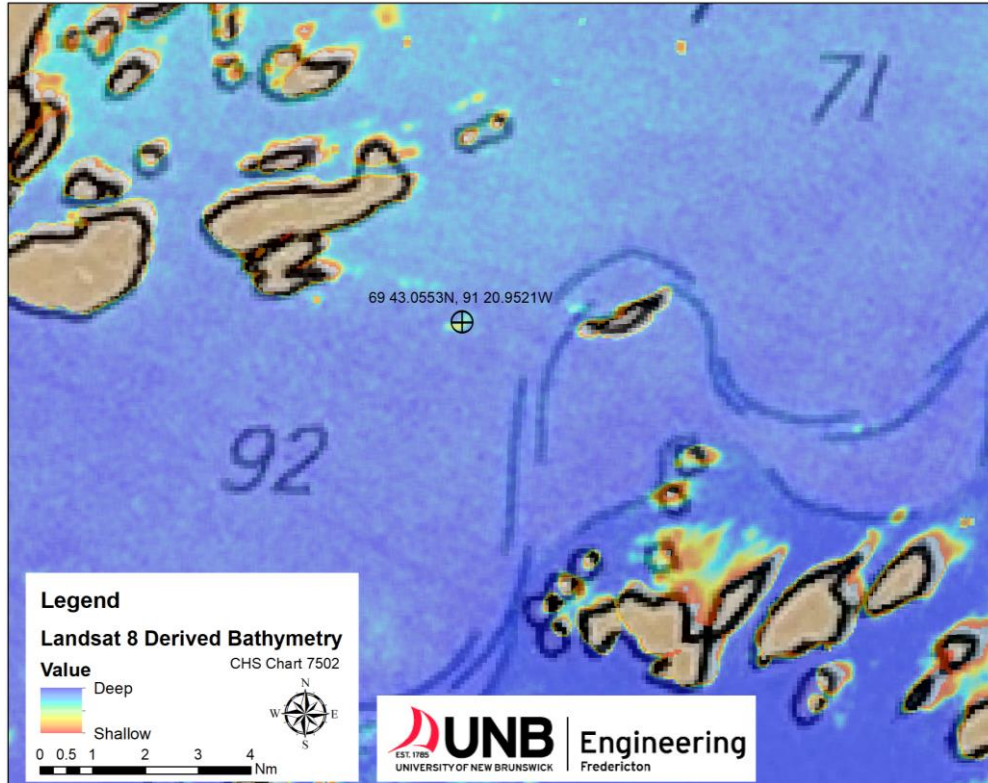


# What are we doing about it?



# New Generation Remote Sensing

Akademic Ioffe Grounding





# Data discovery and expanding data availability

- A promise of unmanned hydrographic survey systems
- Crowd Source Bathymetry – collecting data from “the crowd”
- Shoeboxes- Polar Data Discovery stakeholders workshop- Dec 13, 2020
  - Bringing together Arctic, Antarctic academic, private sector and government, communities to locate data and make available to the global community

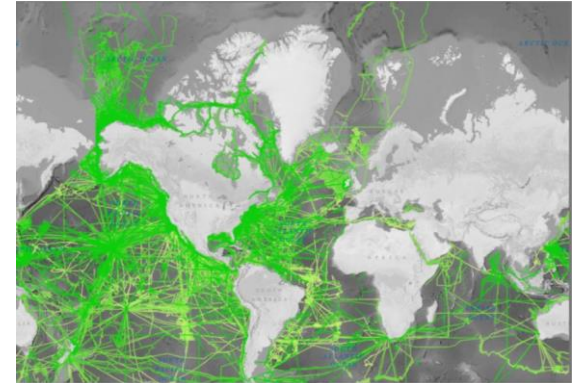


<https://www.ngdc.noaa.gov/iho/>



Image:

<https://www.pmel.noaa.gov/ocs/saildrone>



[https://maps.ngdc.noaa.gov/viewers/iho\\_dcdb/](https://maps.ngdc.noaa.gov/viewers/iho_dcdb/)



# GEBCO, IBCAO, and Seabed 2030



General Bathymetric Chart of the Oceans

GEBCO aims to provide the most authoritative, publicly available bathymetry data sets for the world's oceans.

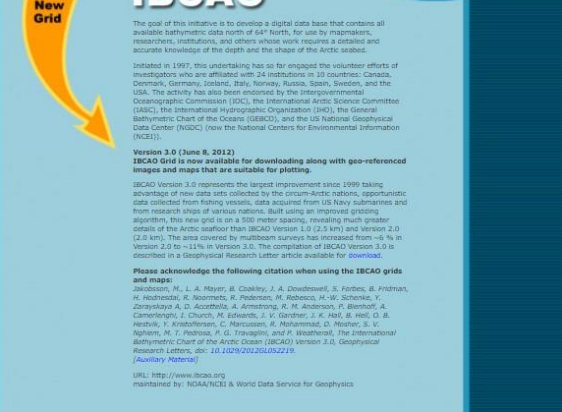
Download GEBCO's global grid | Download polar grids | Contribute data



International Bathymetric Chart of the Arctic Ocean

Downloads  
Tech. Ref. & Sources  
Meeting Reports  
Posters  
Publications  
Related www sites  
Editors  
Contact us

IBC AO



**New Grid**

**IBC AO**

The goal of this initiative is to develop a digital data base that contains all available bathymetric data north of 64° North, for use by maganetists, researchers, institutions, and others whose work requires a detailed and accurate knowledge of the depth and the shape of the Arctic seabed.

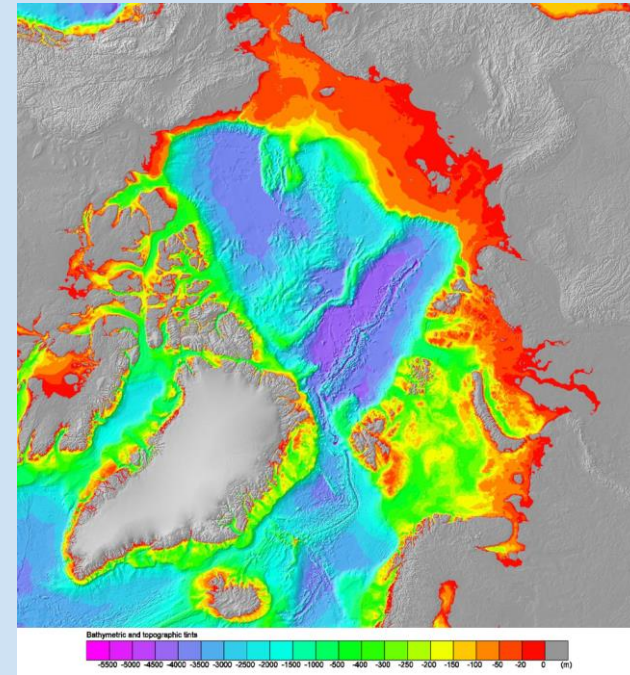
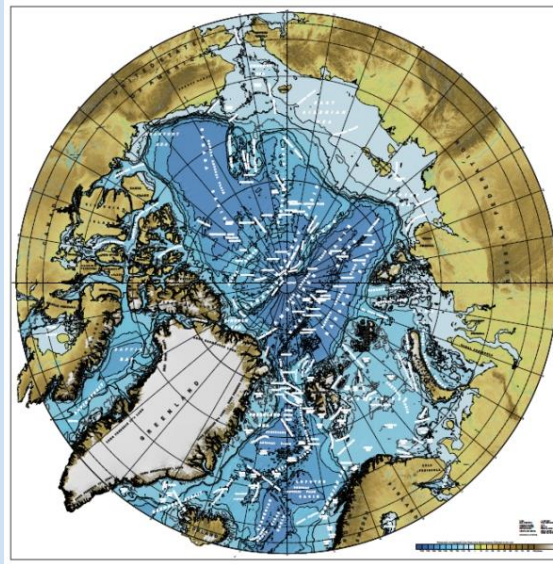
Initiated in 1997, this undertaking has so far engaged the volunteer efforts of investigators who are affiliated with 24 institutions in 10 countries: Canada, Denmark, Germany, Iceland, Italy, Norway, Russia, Spain, Sweden, and the USA. The activity has also been endorsed by the Intergovernmental Oceanographic Commission (IOC), the International Arctic Science Committee (IASC), the International Hydrographic Organization (IHO), the General Bathymetric Chart of the Oceans (GEBCO), and the US National Geophysical Data Center (NGDC) (now the National Center for Environmental Information, (NCEI)).

**Version 3.0 (June 8, 2012)**  
**IBC AO Grid is now available for downloading along with geo-referenced images and maps that are suitable for plotting.**

IBC AO Version 3.0 represents the largest improvement since 1999 taking advantage of new data sets collected by the circum-Arctic nations, opportunistic data collected from fishing vessels, data acquired from US Navy submarines and from research ships of various nations. Built using an improved gridding algorithm, this new grid is on a 500 meter spacing, revealing much greater detail of the Arctic seafloor than IBCAO Version 1.0 (2.5 km) and Version 2.0 (2.5 km). The area covered by multibeam surveys has increased from ~4% in Version 2.0 to ~11% in Version 3.0. The compilation of IBCAO Version 3.0 is described in a Geophysical Research Letter article available for download.

**Please acknowledge the following citation when using the IBCAO grids and maps:**  
 Jakobson, M., L. A. Mayer, B. Coakley, J. A. Dowdswell, S. Fofonov, A. Frimman, H. Garcia, K. R. Gorman, R. P. Hodson, M. Rabeno, M.-W. Schoenke, Y. Zaytseva, A. D. Zavitskiy, A. Arndt, K. R. Bratton, K. M. Bratton, J. Blomhoff, A. Cameron-Ring, J. Church, M. Edwards, J. V. Gardner, J. K. Hill, B. Hill, G. B. Herdick, J. Kristoffersen, C. Maruzamis, R. Mohammad, D. Neider, S. V. Nghiem, M. J. Peirson, P. G. Trivelpiece, and P. Weidner, The International Bathymetric Chart of the Arctic Ocean (IBC AO) version 3.0, Geophysical Research Letters, doi: 10.1029/2012GL016719 (Auxiliary Material)

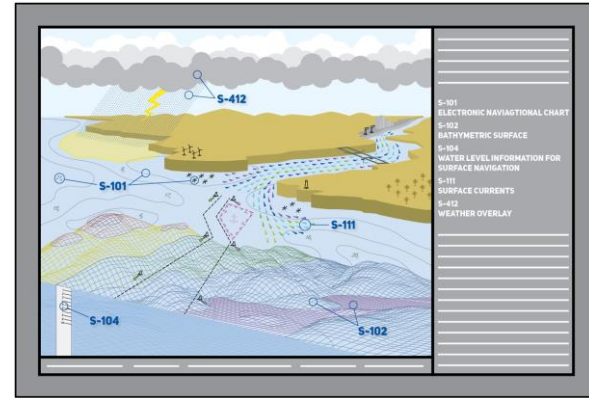
URL: <http://www.ibcao.org>  
 maintained by: NOAA/NGEE & World Data Service for Geophysics



1903: GEBCO established  
 1997: IBCAO established  
 2012: IBCAO (edition 3.0)

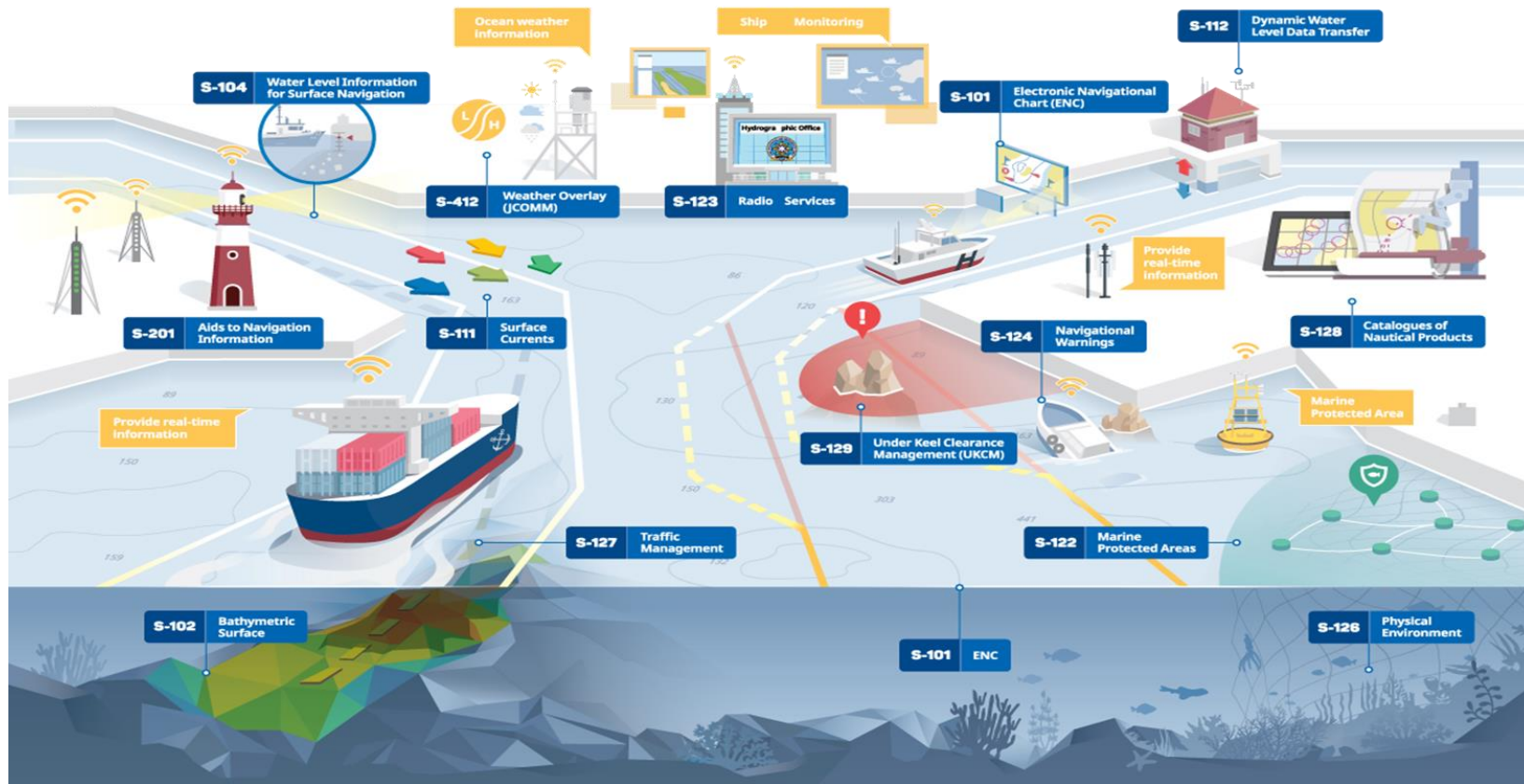
# An exciting decade is here- promise of the S-100 Navigation Services

- New IMO-endorsed global standard for navigation services
- Enabling new services-the emerging WEND-100 concept
- An opportunity in the Arctic to build the future navigation environment
- Decisions last week of the IHO Assembly (Nov 2020)
  - adoption of a S-100 Roadmap for the decade
  - New Strategic Plan that is goal & outcome based with a larger contributing role of hydrography in global governance



S-100 Product Specifications developments and Timeline







# Points of Contact for further interest

- Seabed 2030 RDACC for Arctic and North Pacific: [arctic-pacific@seabed2030.org](mailto:arctic-pacific@seabed2030.org)
- IHO Data Center for Digital Bathymetry (DCDB) and crowd sourced data working group Chair: Director Jennifer Jencks, [Jennifer.Jencks@Noaa.gov](mailto:Jennifer.Jencks@Noaa.gov)
- ARHC: Chair 2019-2021 [Hydrographer@noaa.gov](mailto:Hydrographer@noaa.gov)

