

# Panel 9: Support Related to Safer Polar Navigation

IMO Polar Maritime Seminar  
London, 31 October – 1 November 2022



# Support Related to Safer Polar Navigation

*A hydrographic perspective*

- Intro to ARHC
- Hydrography in the Arctic
- ARHC & PAME MoU
- S-100 in the Arctic
- Looking ahead



## Danish Geodata Agency

State authority under the Ministry of Climate, Energy and Utilities with responsibility for surveying and mapping the waters around Denmark and Greenland as well as for property registration in Denmark, including cadastral and land surveying services.

## Pia Dahl Højgaard

Director General of the Danish Geodata Agency and Danish National Hydrographer. As such representing Denmark in the International Hydrography Organization. In 2022/2033, Chair of the Arctic Regional Hydrographic Commission (ARHC).





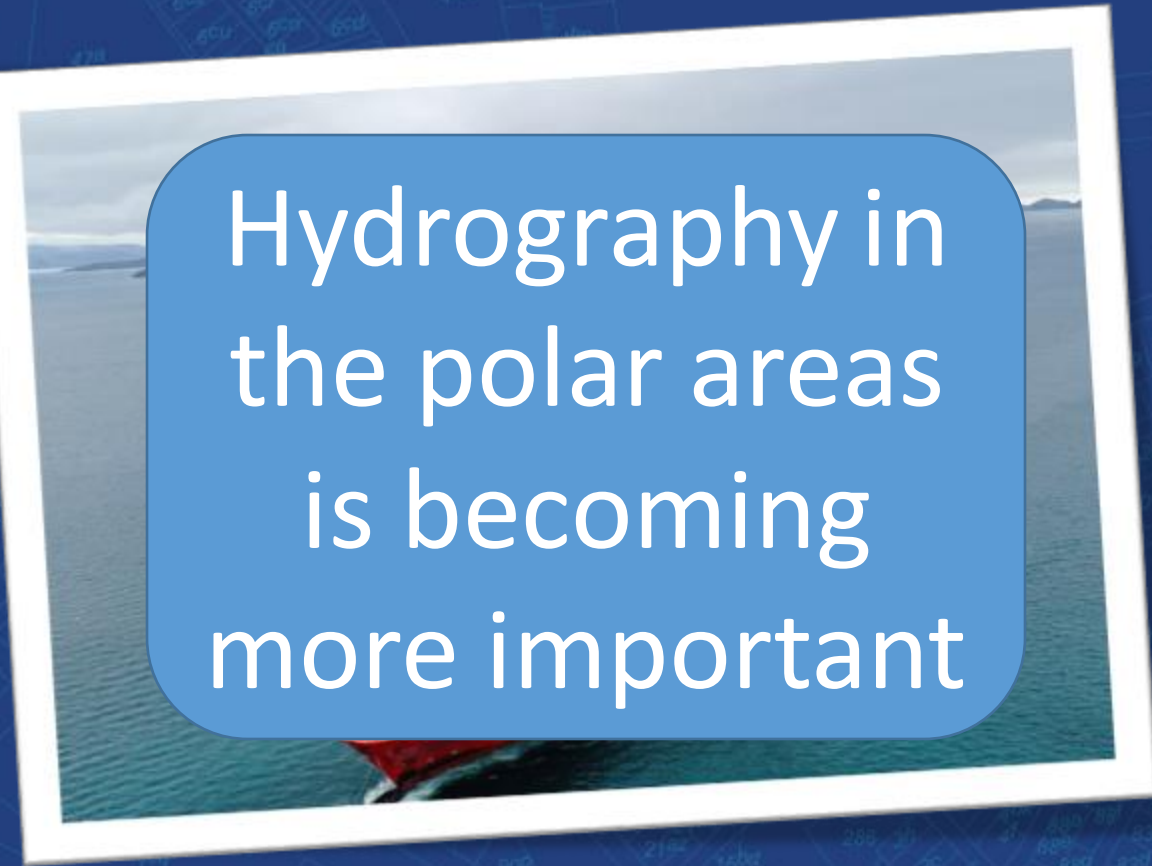
# ARHC (Arctic Regional Hydrographic Commission)

- One of 15 Regional Hydrographic Commissions (RHCs) recognized by the International Hydrographic Organization (IHO)
- RHCs coordinate hydrographic activity and cooperation at the regional level
- ARHC includes the HOs of Canada, Denmark, Norway, the Russian Federation and the United States (Iceland, Finland and Italy as Associate Members)
- Similar RHC for Antarctica (HCA) with 24 member states



# The Arctic is undergoing unprecedented change

- Increased vessel traffic – commercial and leisure
- Unpredictability of sea-ice
- Search and rescue activities, emergency incident response
- Research and monitoring of the marine environment



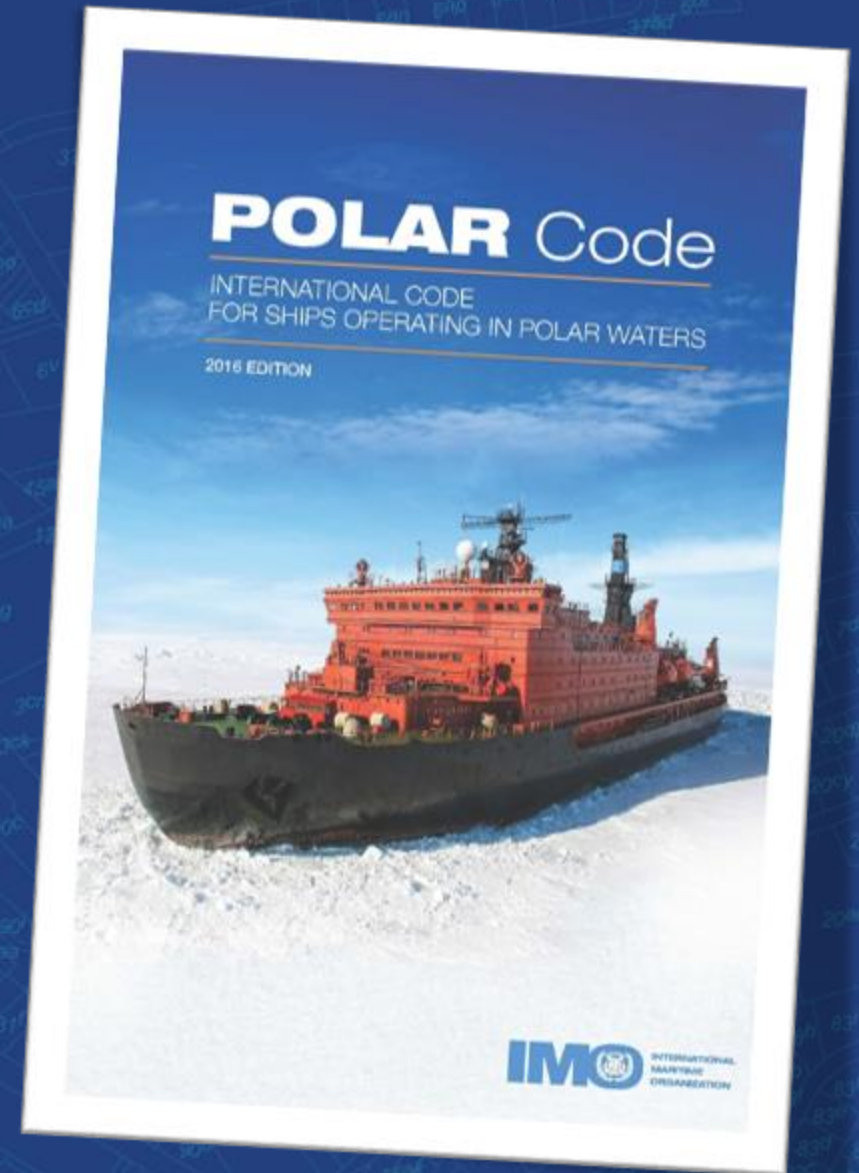
Hydrography in the polar areas is becoming more important





# ECDIS and Polar Code

- According to SOLAS all bigger ships must use Electronic Chart Display and Information System (ECDIS) which is a computerized navigation and information system
- IMO's Polar Code is mandatory under both the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (MARPOL). Ships operating in the Polar regions need to comply with the code.
- Non-SOLAS ships, such as fishing vessels (that hold MARPOL certificates) must still comply with the environmental protection requirements in Part II of the Polar Code.



# Big hydrographic challenges in the Polar regions

- The available survey data tends to be old, incomplete, or non-existent
- Very expensive to survey

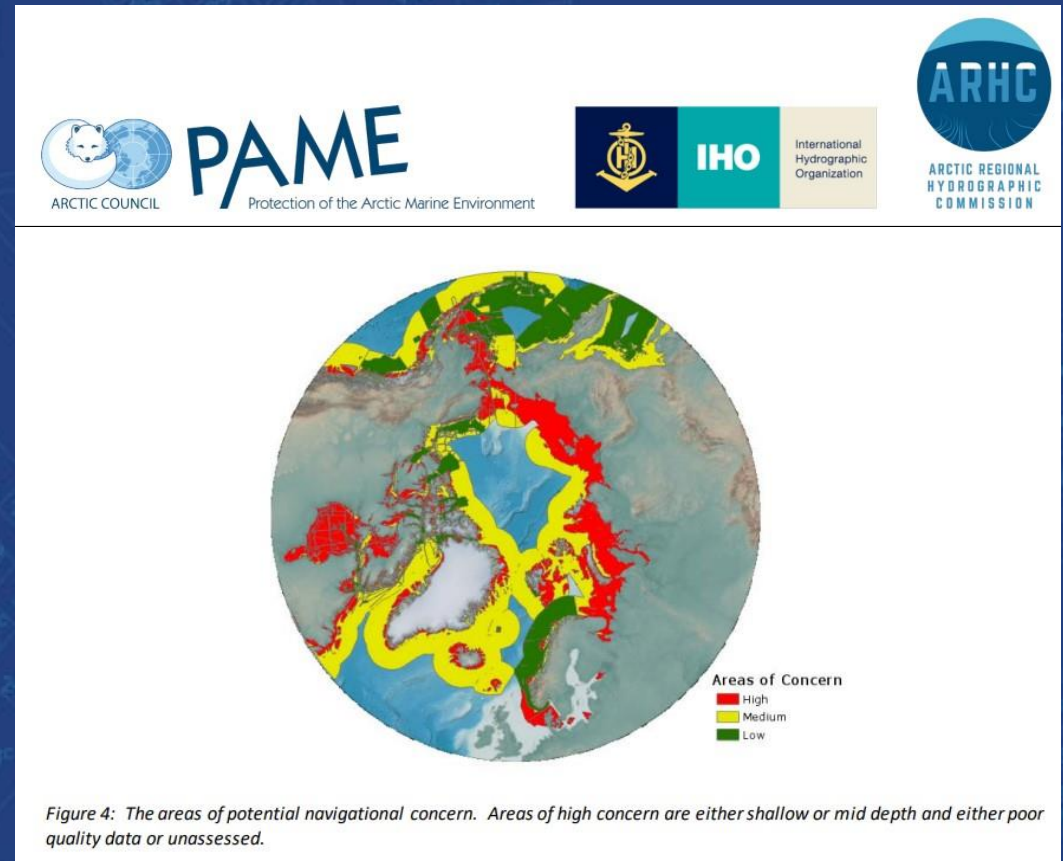


**Calls for  
collaboration  
and innovation!**



# Collaboration

- The ARHC and the Arctic Council's Protection of the Arctic Marine Environment Working Group (PAME) share a common goal of protecting marine environmental health in the Arctic
- ARHC & PAME MoU (2020) to foster greater communication and coordination on strategies to improve hydrographic data in the Arctic
- *Chart Adequacy Assessment* exercise in 2018 and again in 2023.  
How 'adequate' is our data in the Arctic?





# Innovation

- Leverage new technologies to collect hydrographic data in such vast territory
- CSB – Crowd Sourced Bathymetry (Hydrobox & Hydroball in Canadian waters, Gavia Box in Danish waters, Saildrone in US waters)
- Autonomous vehicles
- Engaging local communities (Systems to allow non-experts to collect hydrographic data)
- Utilising traditional knowledge from Coastal Communities – especially in uncharted areas



**Trusted Crowd-Sourced Bathymetry**  
*From the Trusted Crowd to the Chart*

**SAILDRONE SURVEYOR**  
World's largest and most advanced, uncrewed surface vehicle for ocean mapping and exploration

**PAYLOAD OPTIONS**

No.	Variable	Sensor
1	Positioning	Seaech 300+ GNSS/INS system
2	Open-water bathymetry	Kongsberg EM 304 multibeam sonar
3	Shallow-water bathymetry	Kongsberg EM 2040 multibeam sonar
4	Wind speed & direction	BMG WST205
5	Barometric pressure	Yacht Devices YDRG-02N
6	Ocean currents	Siemens EC150ADCP
7	Ocean currents	Siemens EC150ADCP
8	Fish biomass	Siemens EK60 echosounder
9	Sound velocity profiler	Wetzel SWFT SVF (fast depth: 100 m)
10	Surface wind	Siemens SWF 70 (fast or slower of pressure)



# ARHC & PAME Policy Paper 2021

- First, it recommends that the Arctic States review, update, and improve existing, and collect new, bathymetric and hydrographic data in the Arctic Region.
- Second, it encourages these governments to find additional resources to strengthen hydrographic surveying and charting in the Arctic region.
- It further recommends to increase analysis and exchange of meteorological, oceanographic, sea ice, and iceberg information.

This brings us to S-100..





# Improving Navigation: S-100

## What is the IHO S-100 Standard?

Improving navigation with a common set of standards. With more data being shared across maritime and geospatial industries than ever before, S-100 provides a common set of standards to make data accessible, and valuable both now and in the future.



Courtesy: IHO

# Improving Navigation: S-100 in the Arctic

Interoperable datasets as supplementary additional information complementing S-101 ENC, fx:

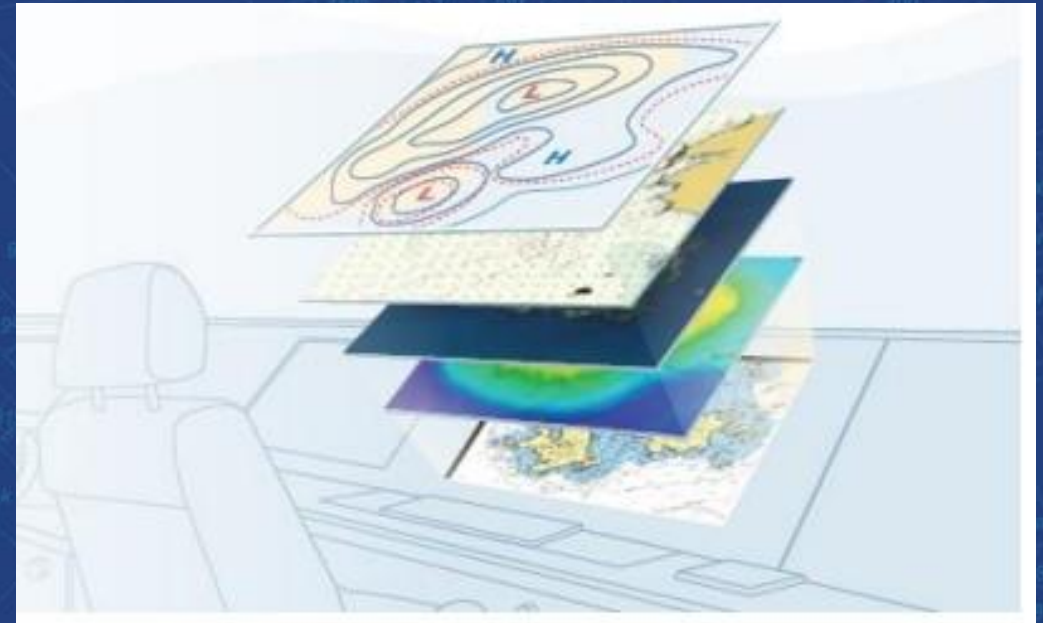
Ice information (S-411)

Navigational Warning (S-124)

Weather overlay (S-412)

While the S-1XX products are specified by IHO - S-2XX, and S-4XX lie with IALA and WMO, respectively.

Implementation roadmap agreed with IMO.



Courtesy: IHO



# Looking ahead

- Chart Adequacy Assessment 2023 – Update on the state of charting in the Arctic
  - The first set of S-100 products to be released by 2026
  - Facilitating increased traffic
  - Including local communities in hydrographic activities (Planned projects by ARHC member states)
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- Increasing knowledge about the oceans – UN Ocean Decade, Seabed2030,
  - Interoperable data to support safe navigation
  - Collaboration and innovation to keep up with a changing environment

