European IHO network

Plenary session

COASTAL MAPPING - High resolution bathymetry in coastal areas

Potential future Arctic Hydrographic projects

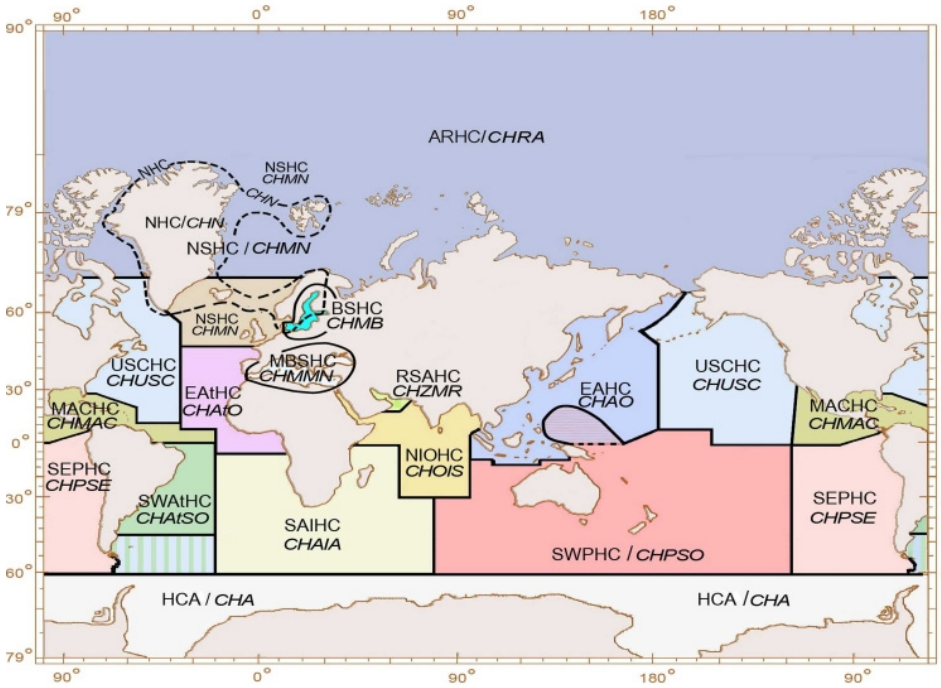
The Arctic Regional Hydrographic Commission

(ARHC)

Danish Geodata Agency

The Arctic Regional Hydrographic Commission

(ARHC)



Agency

Members:
Canada, Denmark, Norway, Russian Federation, United States

Associate Members:
Finland, Iceland, Italy

IHO Secretariat Representatives:
Secretary-General

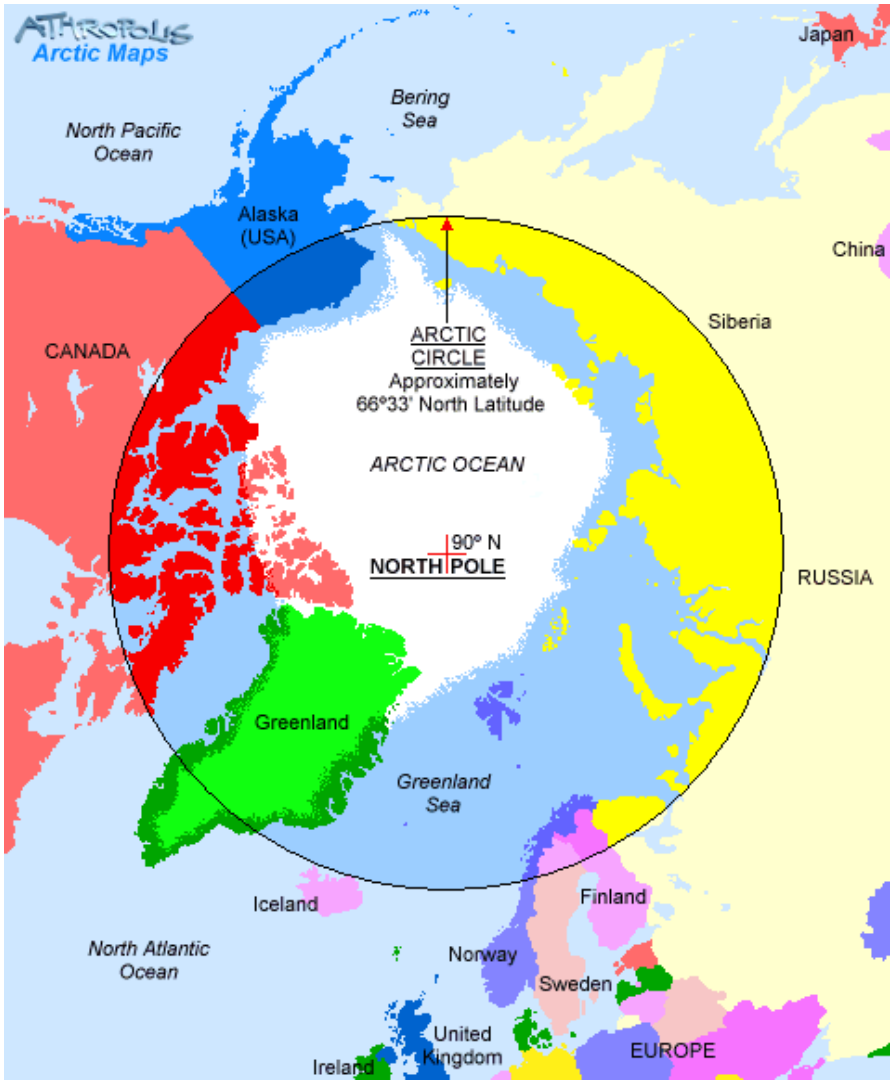
The Arctic:

Only four million people live north of the Arctic Circle due to the severe climate;

The largest communities north of the Arctic Circle are situated in Russia and Norway:
- Murmansk (population 307,257),
- Norilsk (175,365),
- Tromsø (71,295) and Vorkuta (59,231).

In contrast, the largest Greenlandic community north of the Arctic Circle, Sisimiut, has approximately 5,000 inhabitants.

Of the Canadian and United States Arctic communities, Barrow, Alaska is the largest settlement with about 4,000 inhabitants.



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The Arctic waters:

IMO - The Polar Code

Operating in Arctic waters may impose additional demands on ships, their systems and operation beyond the existing requirements of the International Convention for the Safety of Life at Sea (SOLAS)

The Polar Code acknowledges that the polar waters impose additional navigational demands beyond those normally encountered. In many areas, the chart coverage may not currently be adequate for coastal navigation. It is recognized even existing charts may be subject to unsurveyed and uncharted shoals.

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offices and are based on the latest information available, substantial areas in the Arctic still rely on limited, outdated, or insufficient depth and other data.

RESOLUTION MSC.385(94)
(adopted on 21 November 2014)

INTERNATIONAL CODE FOR SHIPS OPERATING IN POLAR WATERS (POLAR CODE)

Figure 2 – Maximum extent of Arctic waters application[3]

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The Arctic waters:

Arctic Waters

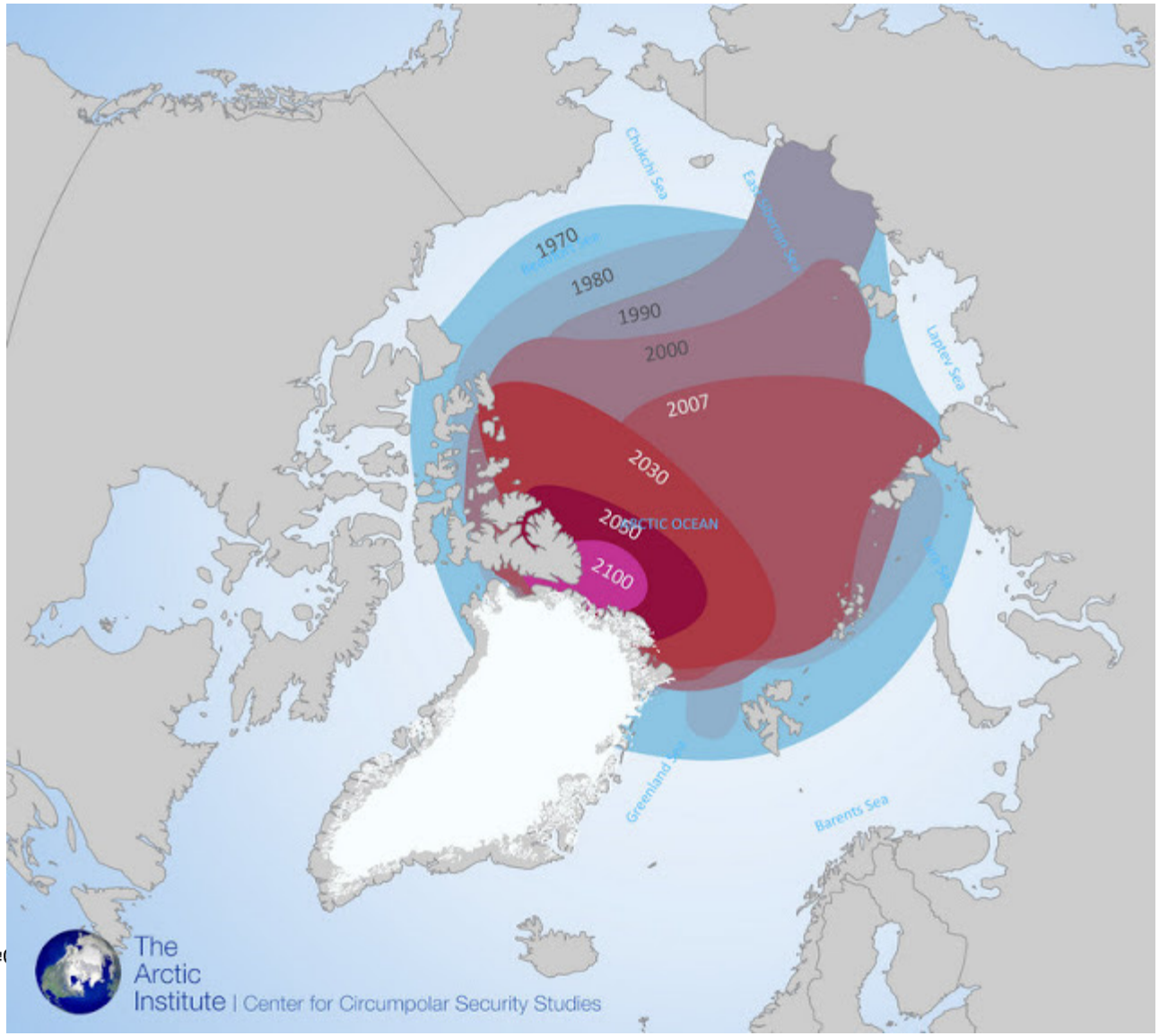
A key characteristic of Arctic waters is the **limited number of ports of call,** most of them ice-covered for part of the year.

Significant obstacles to shipping such as icing from sea spray, wind chill, remoteness as well as their implications for rescue and emergency operations.

During the winter and spring months ice conditions along Arctic shipping routes will remain heavy, and the amount of floating sea ice and number of icebergs - a hazard to the safety of marine transport, may increase during the early melt season as more ice floes break apart and drift across the Arctic Ocean.

Longer ice-free periods

Sea ice extent observations (1970 to 2007) and forecast (2030 to 2100) reproduced using data from the NOAA GFDL model.
Yearly extent represents an average 80 percent sea ice concentration.



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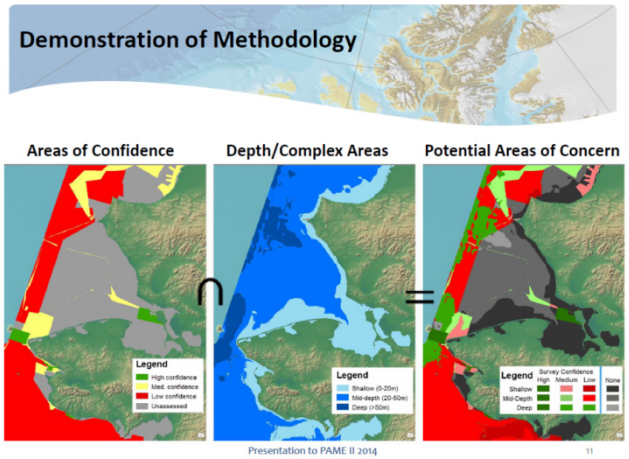
The Future of Arctic Shipping (Northwest Passage & Northern Sea Route)

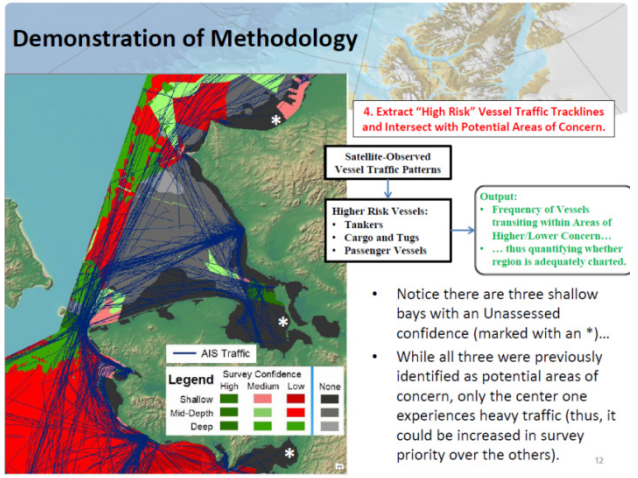
Source: Hugo Ahlenius, UNEP/GRID-Arendal

Shorter sailing distances
=>
Shipping operators can achieve cost savings through a reduction of number of days at sea, energy efficiency improvements due to slower sailing speeds.

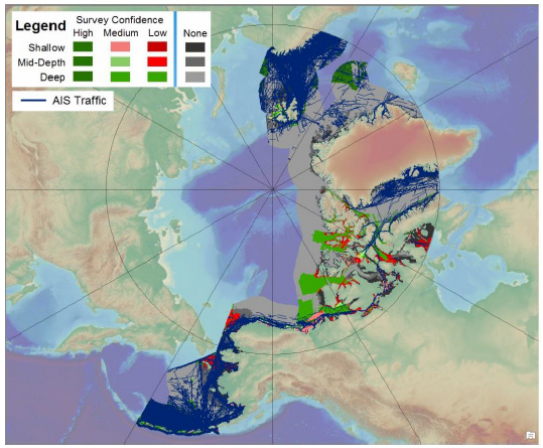
Arctic Regional Hydrographic Commission (ARHC)

ARHC's methodology to addressing charting adequacy:



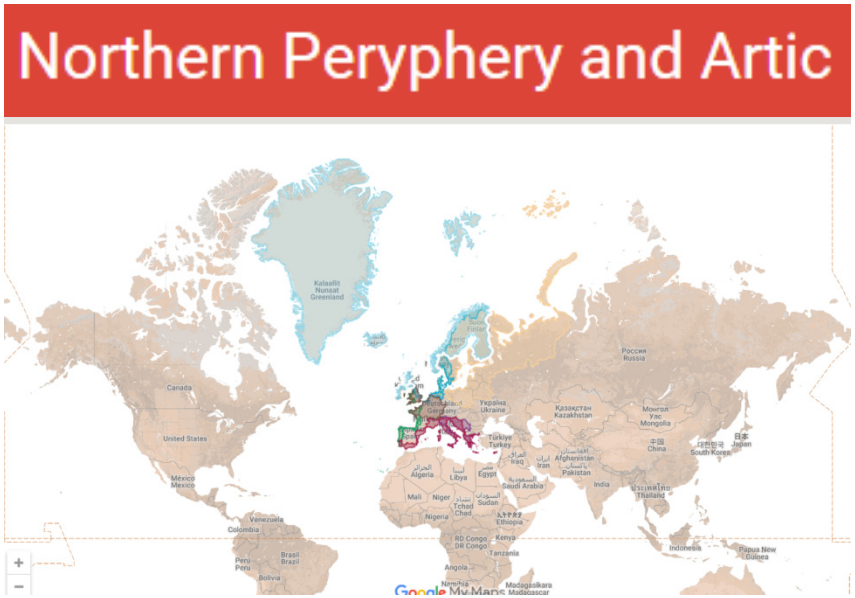


- Notice there are three shallow bays with an Unassessed confidence (marked with an *)...
- While all three were previously identified as potential areas of concern, only the center one experiences heavy traffic (thus, it could be increased in survey priority over the others).



The analysis tells us:

1. There are vast portions of the Arctic that are **not adequately surveyed** .
2. There is **navigation risk** and the risk is increasing.
3. Navigated routes may expand **beyond adequate chart coverage** (e.g. ice conditions may force vessels out of charted corridors).
4. **Collaboration and sharing of information is necessary**.



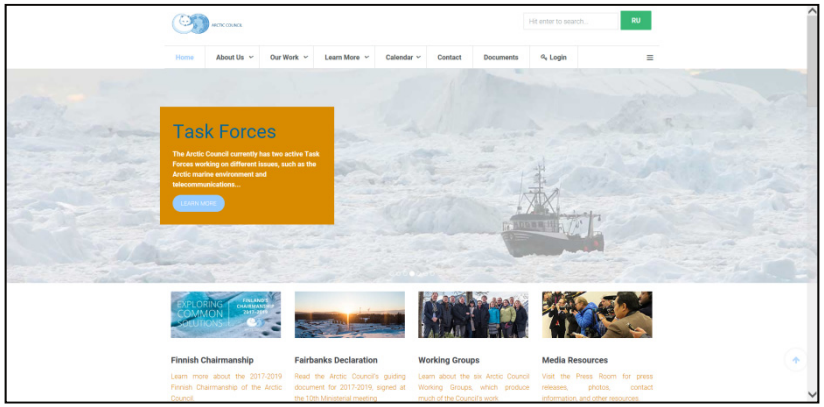
Coastal Mapping and Data in the Programme
2 other priority axis of the programme have a significant maritime dimension which imply coastal data and mapping activities:

Priority Axis 1 – Using Innovation to Maintain and Develop
Robust and Competitive Communities - **mentions developping maritime technologies** in the Atlantic part of the Programme as a specialisation field of the Region to exploit.

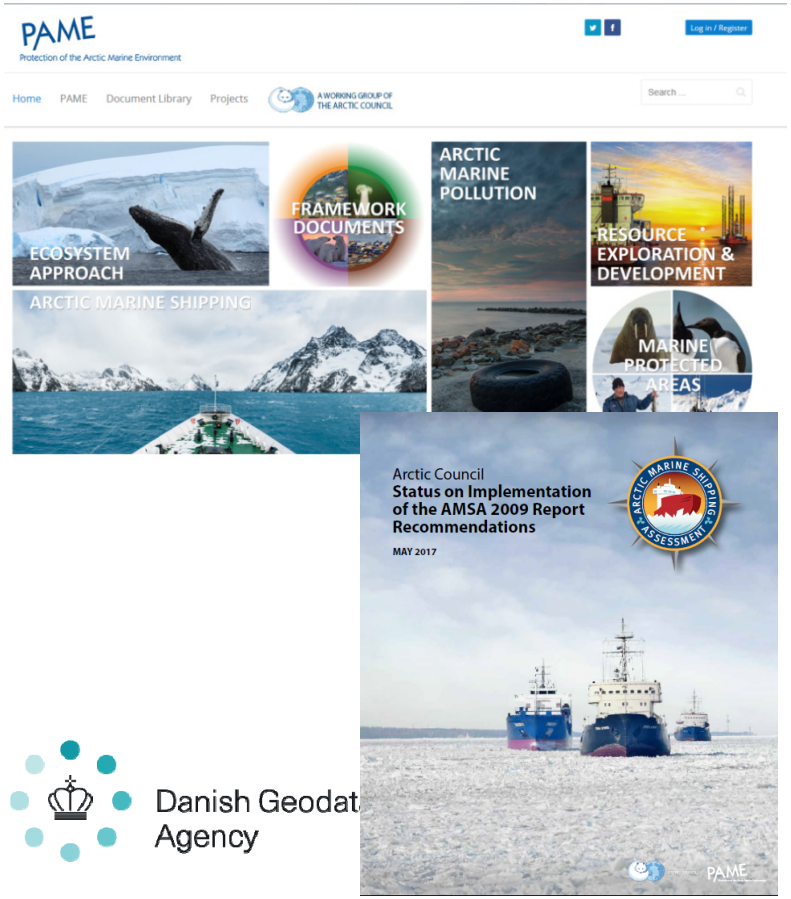
Priority Axis 2 – **Promoting Entrepreneurship** to Realise the Potential of the Programme Area's Competitive Advantage - **covers the Blue Growth strategy** of the EU.

The recommendation is to propose projects in Priority Axis 4 – Protecting, Promoting and Developing Cultural and Natural Heritage –
the Programme aims to contribute to increase capacity of remote and sparsely populated communities for sustainable environmental management.
The actions developed in the framework of this Priority Axis are envisaged to be mainly focused on, but not limited to, issues such as land use, fresh water supply, **coastal management**, ocean acidification, natural resource management, biodiversity, **natural hazards, and climate change impacts.**

The Arctic Council



Protection of the Arctic Marine Environment



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Arctic Marine Shipping Assessment (AMSA)

Status of Progress on Recommendations

6 THEME I — Enhancing Arctic Marine Safety

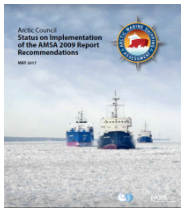
6 I(A). Linking with International Organizations
8 I(B). IMO Measures for Arctic Shipping
10 I(C). Uniformity of Arctic Shipping Governance
10 I(D). **Strengthening Passenger Ship Safety in Arctic Waters**
11 I(E). **Arctic Search and Rescue (SAR)**

THEME III — Building the Arctic Marine Infrastructure

18 III(A). **Addressing the Infrastructure Deficit**
19 III(B). Arctic Marine Traffic System
20 III(C). Circumpolar Environmental Response Capacity
22 III(D). **Investing in Hydrographic, Meteorological and Oceanographic Data**

The Arctic Council's work on safe shipping and the protection of the Arctic Ocean is more important now than ever before.

Arctic Marine Shipping Assessment (AMSA)



III. Building the Arctic Marine Infrastructure

A. Addressing the Infrastructure Deficit: That the Arctic states should recognize that **improvements in Arctic marine infrastructure are needed to enhance safety and environmental protection** in support of sustainable development. Examples of infrastructure where critical improvements are needed include: ice navigation training; navigational charts; communications systems; port services, including reception facilities for ship-generated waste; accurate and timely ice information (ice centers); places of refuge; and icebreakers to assist in response.

B. Arctic Marine Traffic System: That the Arctic states should support **continued development of a comprehensive Arctic marine traffic awareness system to improve monitoring and tracking of marine activity, to enhance data sharing in near real-time,** and to augment vessel management service in order to reduce the risk of incidents, facilitate response and provide awareness of potential user conflict. The Arctic states should encourage shipping companies to cooperate in the improvement and development of national monitoring systems.

C. Circumpolar Environmental Response Capacity: That the Arctic states decide to continue to develop circumpolar environmental pollution response capabilities that are critical to protecting the unique Arctic ecosystem. This can be accomplished, for example, through circumpolar cooperation and agreement(s), as well as regional bilateral capacity agreements.

D. Investing in Hydrographic, Meteorological and Oceanographic Data: *That the Arctic states should* ***significantly improve, where appropriate, the level of and access to data and information in support of safe navigation and voyage planning in Arctic waters.*** *This would entail increased efforts for: hydrographic surveys to bring Arctic navigation charts up to a level acceptable to support current and future safe navigation; and systems to support realtime acquisition, analysis and transfer of meteorological, oceanographic, sea ice and iceberg information.*

Arctic Regional Marine Spatial Data Infrastructures Working Group

ARMSDIWG (ɑrmz - dē - wɪg)

A regional approach to MSDI
Currently represented nations:
Canada, Denmark, Finland, Iceland, Norway, United States **(Chair)**

Leveraging technology, standards, and governance for better data access and interoperability.

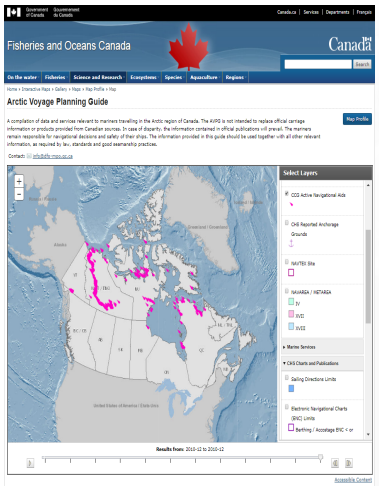
The ARMSDIWG analyzes how its participating HOs can contribute marine spatial data. In order to accomplish this, the working group investigates best practices for leveraging currently available technologies, identifies applicable open geospatial standards from the IHO and the Open Geospatial Consortium (OGC), and addresses policies & governance for the participating nations to provide users discoverable, accessible, and interoperable marine geospatial data for the Arctic.

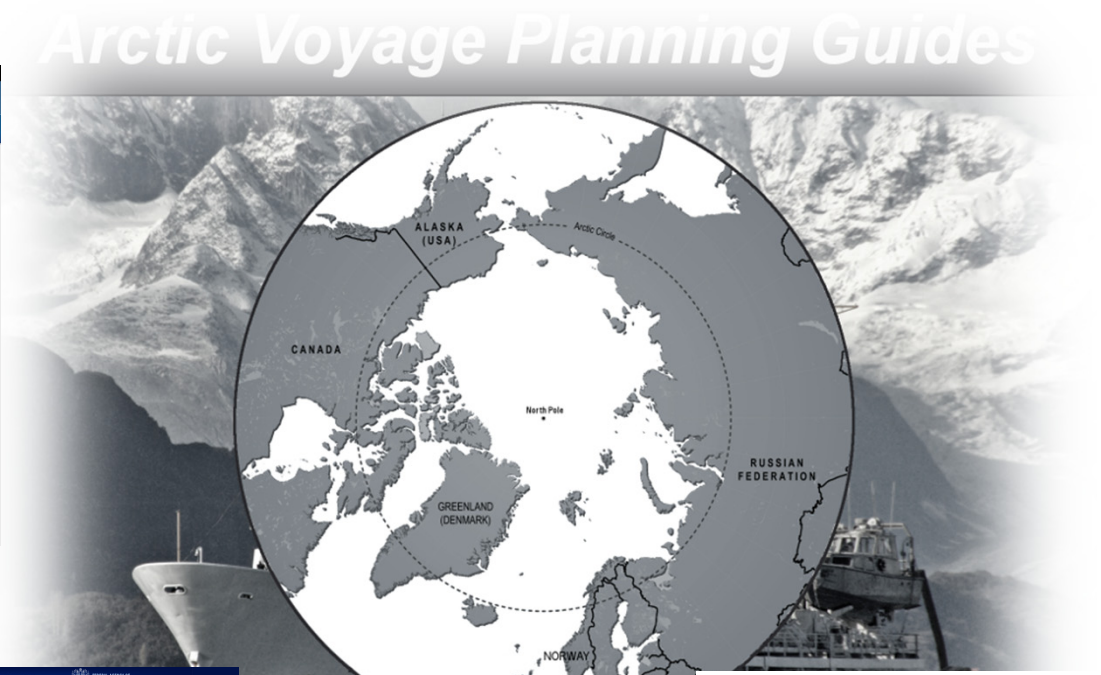
The ARMSDIWG is currently tasked to research two projects for the ARHC:

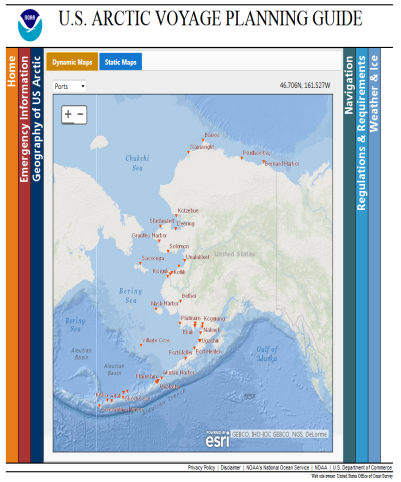
- Incorporate themes of the Artic Voyage Planning Guide (AVPG) into a web-based, geospatial portal where information is linked and spatially represented in a unified, regional view.
- Investigate the possibility of a Pan-Arctic Bathymetry Database that could be used to support key, non-navigational activities in the region if made available in an efficient and formal infrastructure.

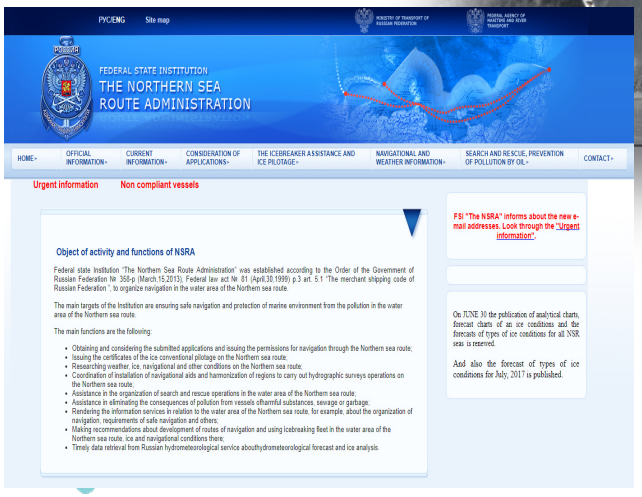
Harmonization of Arctic Voyage Planning Guide for Pan Arctic Coverage – pivoting from this document, but with a MSDI approach.

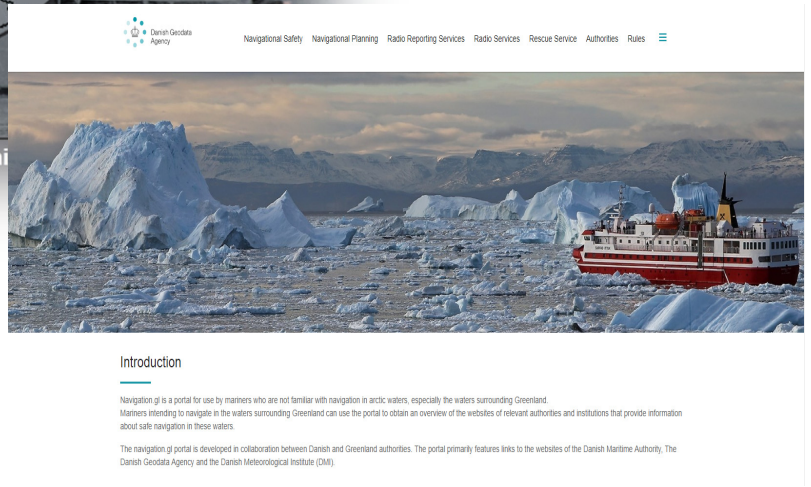
- Incorporate themes of the Artic Voyage Planning Guide (AVPG) into a web-based, geospatial portal where information is linked and spatially represented in a unified, regional view.





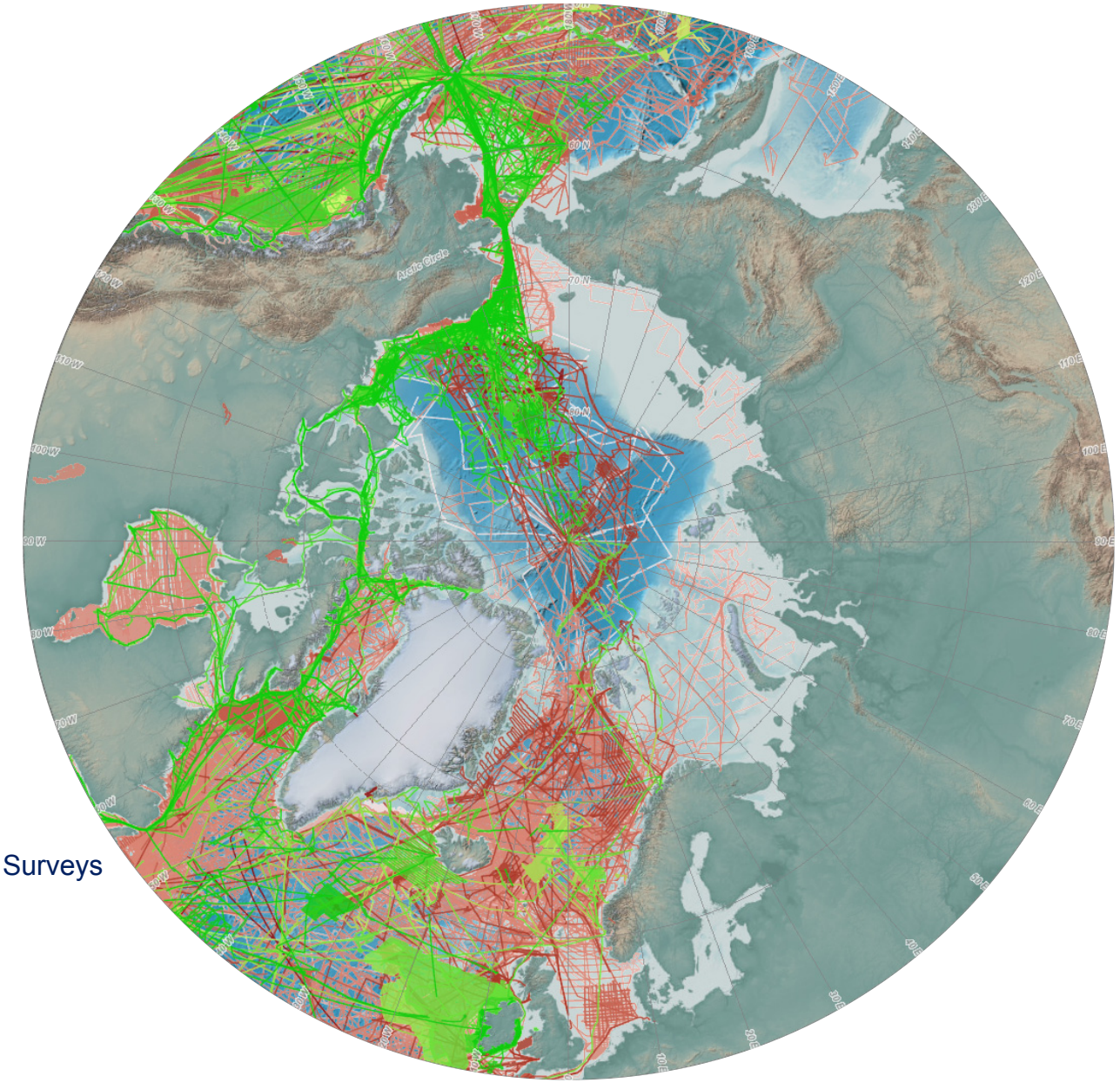






- Investigate the possibility of a Pan-Arctic Bathymetry Database that could be used to support key, non-navigational activities in the region if made available in an efficient and formal infrastructure.

The IHO DCDB is hosted by the U.S. National Oceanographic and Atmospheric Administration (NOAA) on behalf of the IHO Member States.



Multibeam Bathymetric Surveys
Single-Beam (Trackline) Bathymetric Surveys

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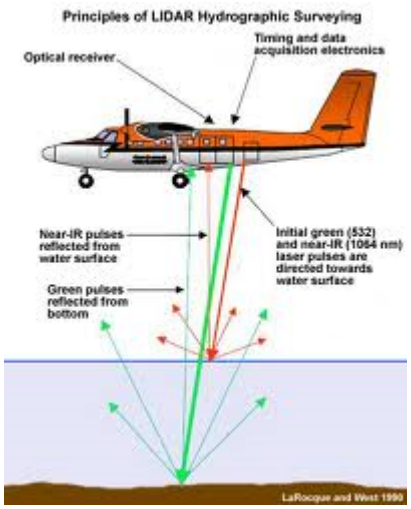
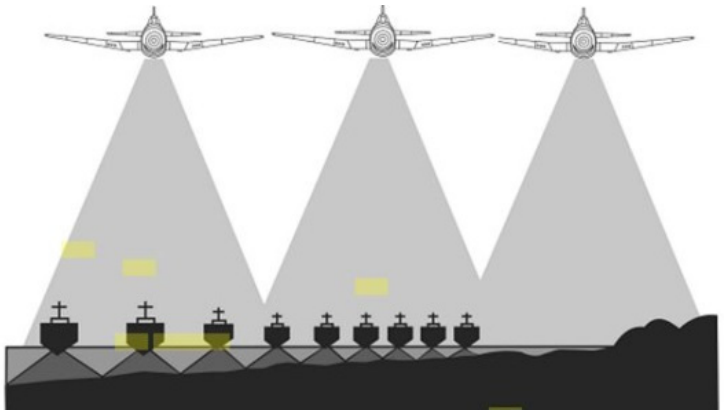
Potential future Arctic Hydrographic projects

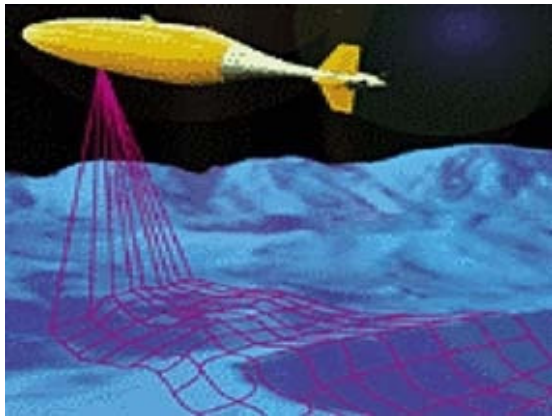
Data collection in an Arctic perspective:

There is a need to account for the integration of diverse data sources/capabilities such as (but not limited to);

- Autonomous surface and submerged vehicle data collection
- Satellite Derived Bathymetry
- Airborne imaging for shallow water bathymetric collection (Bathy Lidar)
- Shipboard active bathymetric data collection
- Crowd-sourced bathymetric data collection
- Multi-disciplinary data collection
- Vertical Datum (collection and modeling)







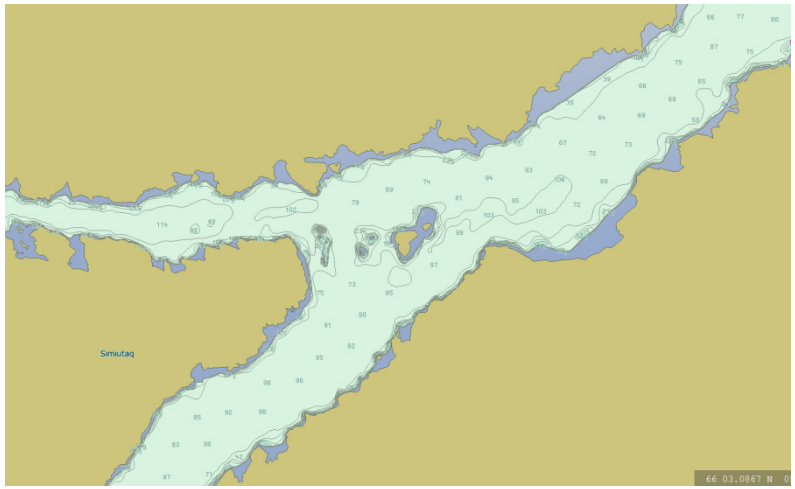
Potential future Arctic Hydrographic projects

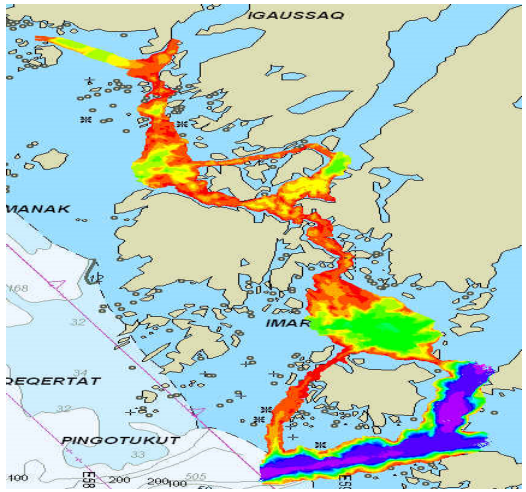
Data infrastructure and digitalization in an Arctic perspective:

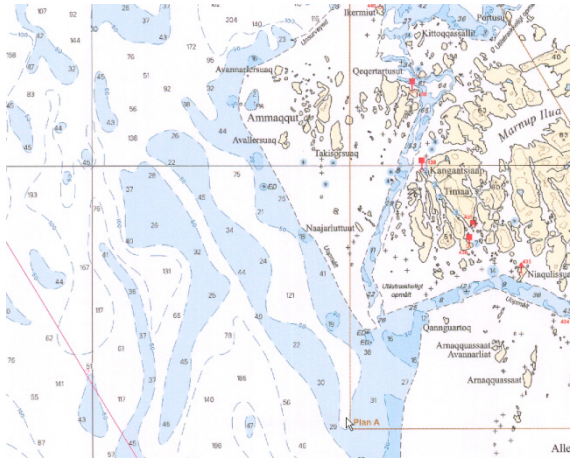
- Bringing the Arctic Land and Sea together.
  Focusing on how to combine and coordination the Arctic SDI and the Arctic MSDI
- Establishing a new accurate coastline

Safety of navigation in an Arctic perspective

- Establishing an Arctic planning guide
- Faster updated of digital navigational charts to the Arctic end users
- Establishing an Arctic maritime risk assessment tool







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