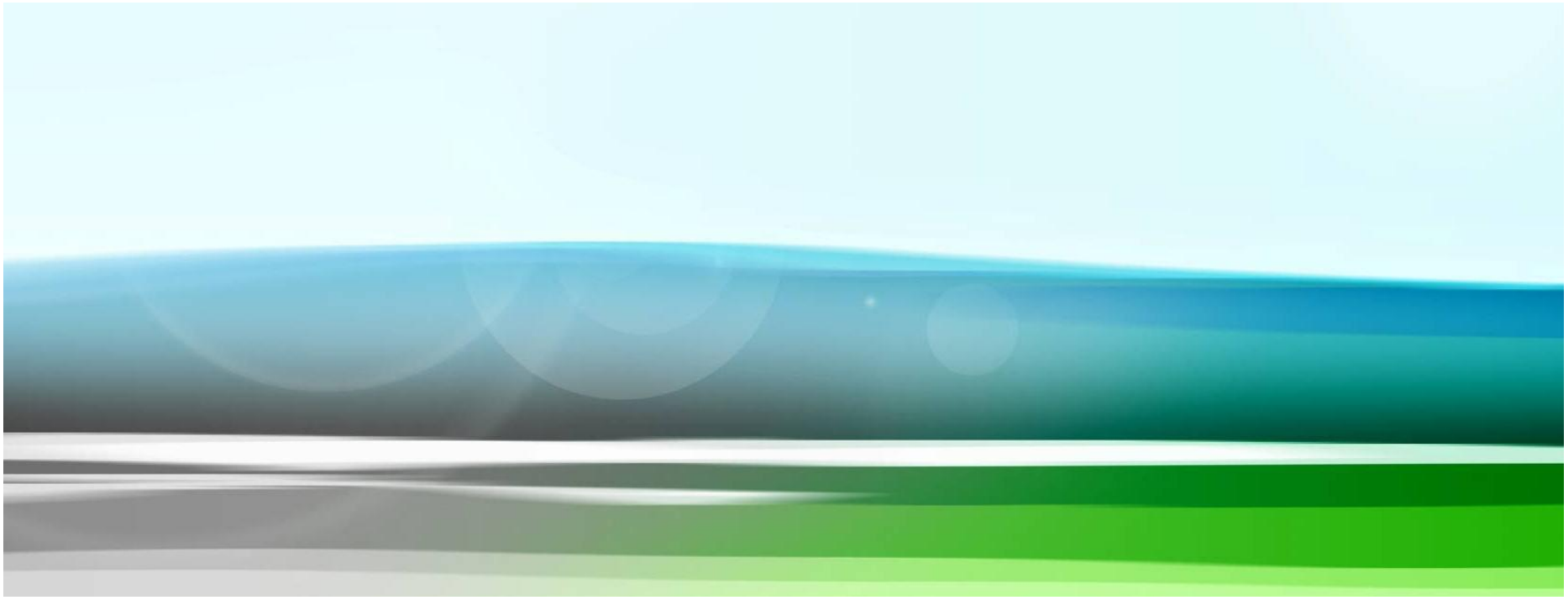


# Overview of challenges and rules for ships navigating in Arctic waters

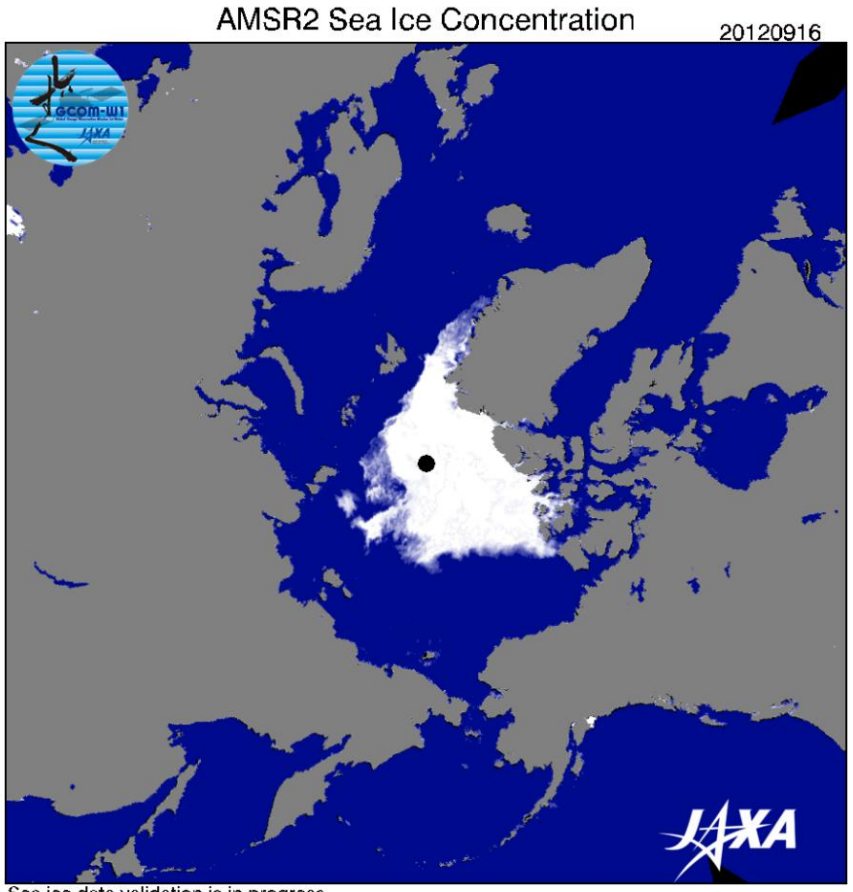
Tokyo

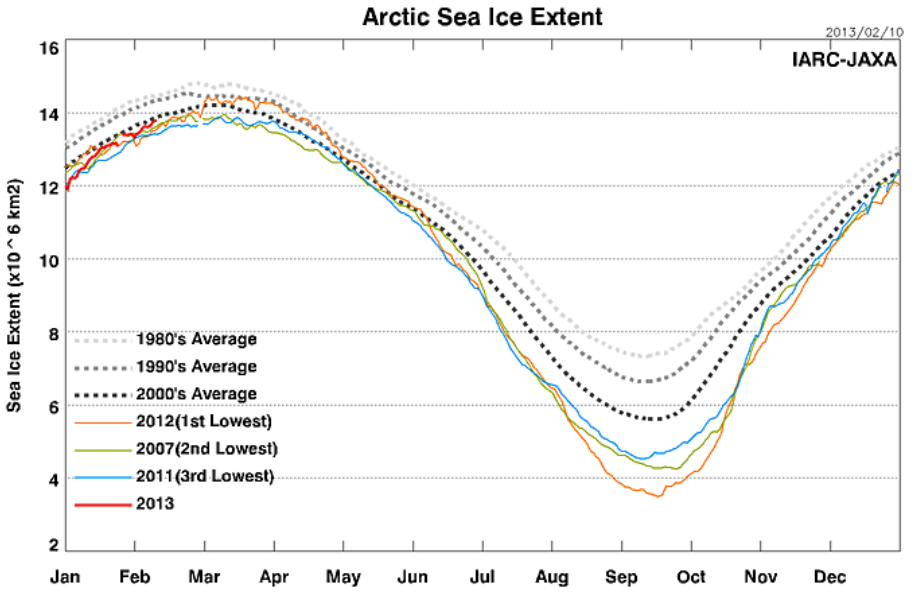
Yoshinori Miura / Head of Class Operations Japan
2013.02.28

MANAGING RISK

# Ice is melting, but large seasonal variations

Ice covered area in summer/autumn 2012 was the smallest, but not so much difference in winter and spring. Despite less ice in summer/autumn, there are yet many risks in Arctic.

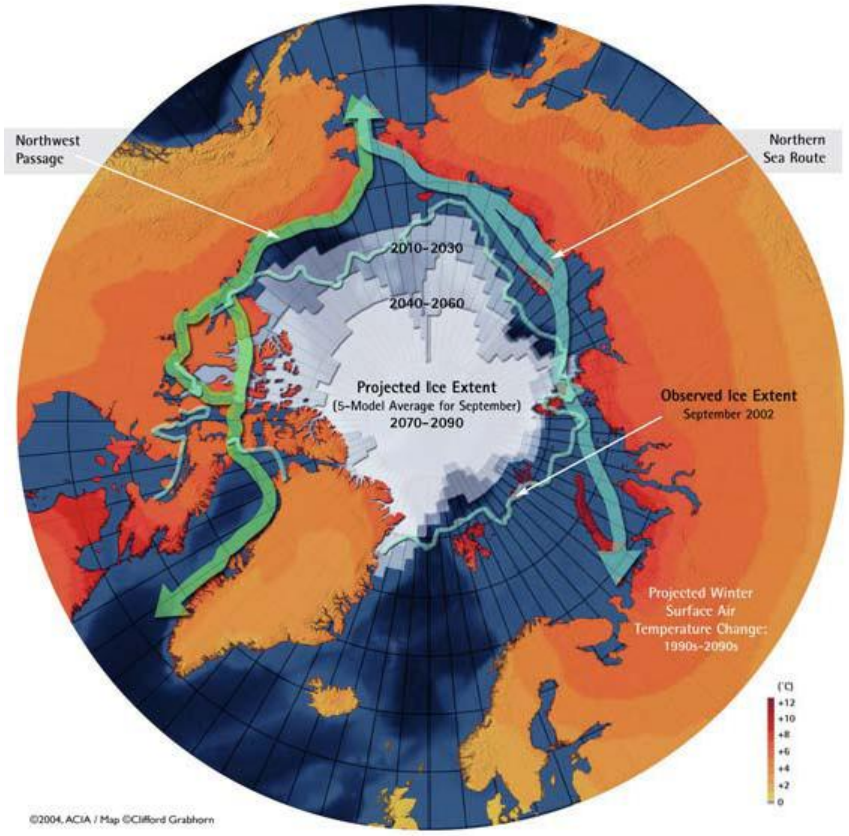



http://www.ijis.iarc.uaf.edu/cgi-bin/seaice-monitor.cgi?lang=j

# Shipping across the Arctic Ocean

Increased melting of Arctic sea ice may lead to a longer navigation season, improved accessibility for shipping, and extended use of shipping routes along NSR (Northern Sea Route) and NWP (Northwest Passage).




# Traditional ICE Class

| ICE CLASS | |
|---|---|
| **Baltic** | |
| **Arctic** | |
| Ice strengthening<br>• Hull<br>• Rudder/ stock<br>• Propeller/ shaft | ME output<br>Sea chest<br>Ballast water anti-freezing |

# DNV rules for ice / arctic class

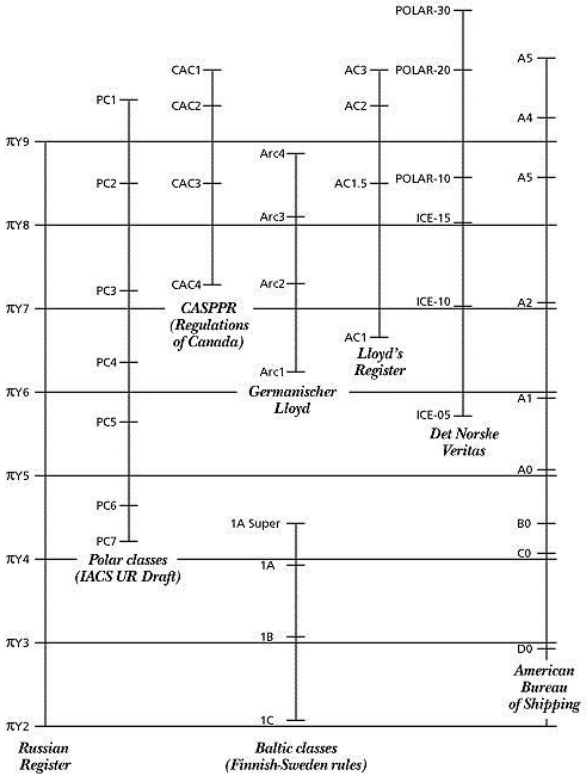
| DNV Class Notations | Equivalent Baltic Ice class | IACS Polar Class | Ice Conditions | Impact Limits |
|---|---|---|---|---|
| **ICE-C / E** |  | | Very light ice condition | |
| **ICE-1C** | | | **- First year ice and assisted operation** | No ramming |
| **ICE-1B** | | | 0.4 m ice thickness | |
| **ICE-1A** | | **PC7** | 0.6 m ice thickness<br>0.8 m ice thickness | |
| **ICE-1A*** |  | **PC6** | 1.0 m ice thickness | |
| **ICE-1A*F** | | | 1.0 m ice thickness | |
| **ICE-05** | | **PC5** | | |
| **ICE-10** | | | First year ice with pressure ridges | |
| **ICE-15** | | **PC4** | | |
| | | **PC3** | | Occasional ramming |
| **POLAR-10** | | **PC2** | | |
| **POLAR-20** | | **PC1** | Multi year ice with glacial inclusions | |
| **POLAR-30** | | | | |
| **ICEBREAKER** | | **PC1** | | Repeated ramming |
| | | ***NOT DIRECTLYOMPARABLE*** | | |

# There have been many ice rules, but not cover all risks…

Every classification society, local-area governments and international organizations have made own ice class rules. Each of them is not totally identical, rather many variations.

- FSCIR: Finish-Swedish Ice Class Rules
- Classification rules, etc.
- ASPPR: Arctic Shipping Pollution Prevention Regulations (Canada)
- Regulations for Navigation on the Seaways of the Northern Sea Route
- IMO Guidelines
- IACS Polar Class: UR I1, I2, I3

*Comparison between different rules for ice strengthening. Carried out by Krylov Institute in St. Petersburg*



# Challenges in Arctic waters or cold climate

# Arctic / Cold Climate challenges for ships and offshore units

Risk in Arctic is higher than other oceans due to unique characteristics.

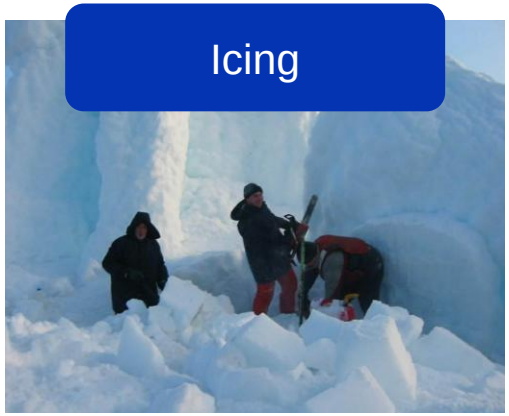
Risk = Probability of Incident x Consequence of Incident ⇒ High in Arctic

- Low temperatures
  - Working Environment
  - Selection of material/Certification of equipment
- Ice
  - Sea ice and ice loads
  - Icebergs and Ice management
  - Icing
  - Complicating rescue and oil spill response
- Darkness
  - Working environment
  - Rescue
- Operation
- Remoteness
  - Emergency preparedness
  - Transportation of personnel and equipment
- Vulnerable Environment
  - Emission to air
  - Discharge to water

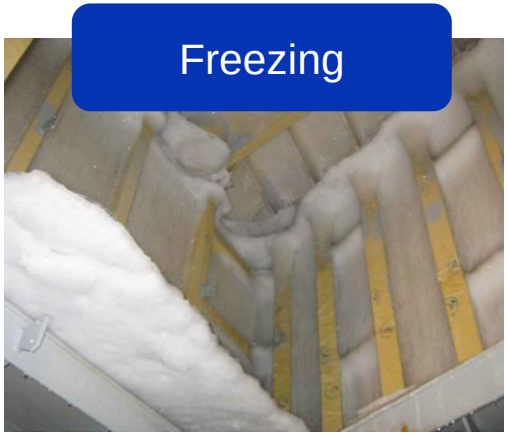
# Do traditional ICE rules and guidelines manage risks in Arctic?

# Winterized notations for Cold Climate - Background

DNV has introduced rules for winterization of ships in January 2006 to protect people, vessels and environment from cold climate issues such as low temperature impact on materials, equipment and systems, ship icing, special propulsion and manoeuvring challenges in ice .



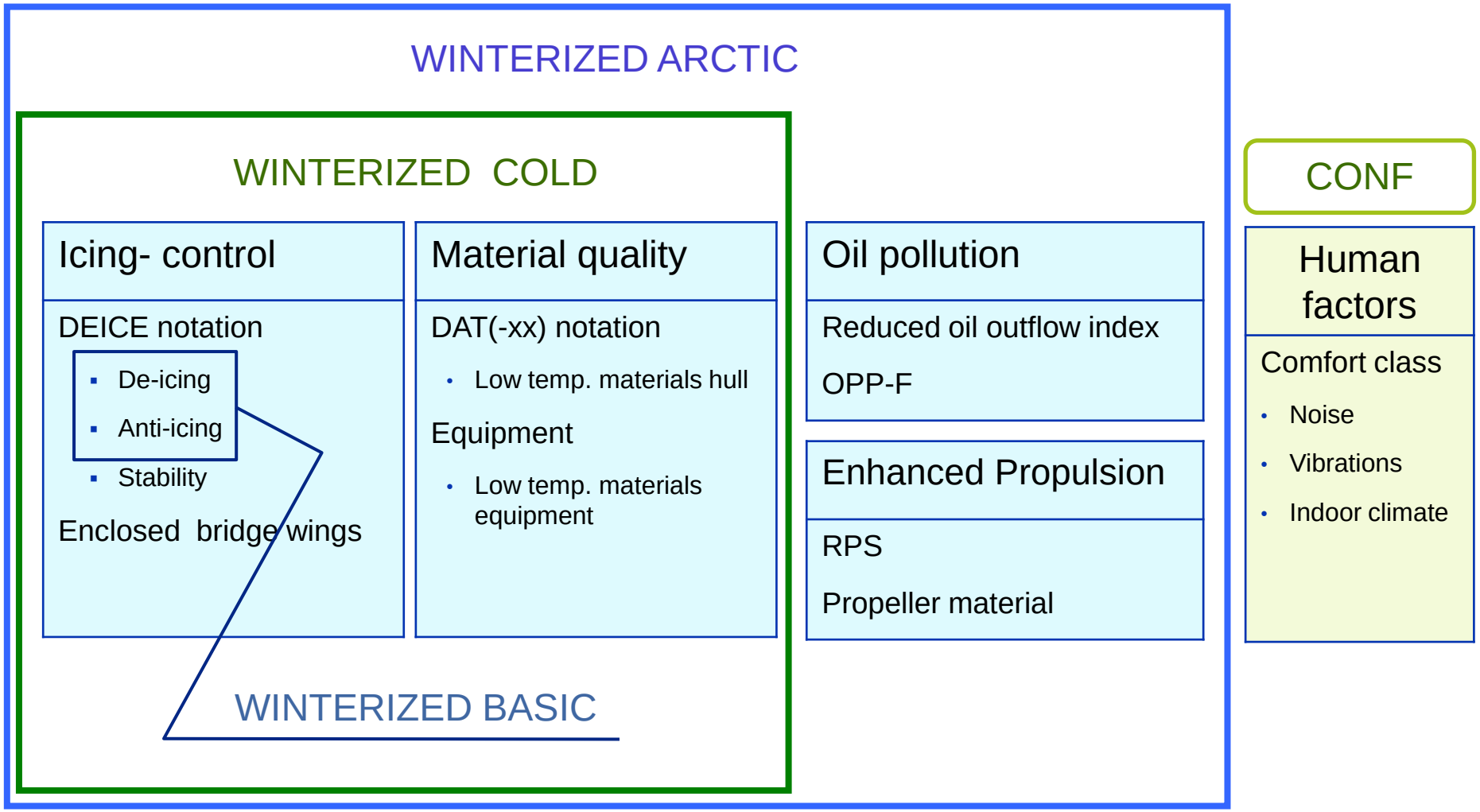



## Objectives of winterization notation

- Personal Safety and Health
  - Physical effects such as fatigue, frostbite, hypothermia
- Installation Safety
  - Safety-critical equipment and systems
- Operability
  - Systems to maintain the functionality of desired operations
- Environment Safety

# DNV classification notations: WINTERIZED



# Anti-icing and De-icing Definitions – Category I and II

| Category I<br>Anti-Icing | Category II<br>De-Icing |
|---|---|
| Equipment/areas to be free from ice at all time | Removal of ice from equipment/areas within a reasonable period of time, 4-6 hours |
| Navigation<br>Steering<br>Propulsion<br>Anchoring<br>Fire extinction<br>Lifesaving<br>Escape route | Open decks<br>Gangways and stairways<br>Superstructure<br>Railings<br>Outdoor piping<br>Mooring winches<br>Deck lighting |

# Vessels with Winterized class

There are 40 DNV classed vessels with Winterized notations


1A1 Tanker for Liquefied Gas
**WINTERIZED BASIC COMF-V(1)C(2) OPP-F**
E0 F-AMC ICS HMON(2) CSA-2 PLUS-2 BIS TMON
NAUTICUS(Newbuilding)


+1A1 Ship-shaped Drilling Unit(N)
**PC-4 WINTERIZED COLD (-20 °C, -30 °C)**
HELDK-SH CRANE E0 F-AM DYNPOS-AUTRO
DRILL(N)

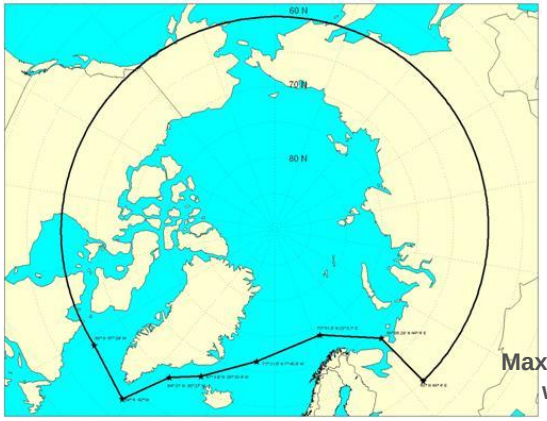
# IMO regulations – overview

There are no internationally binding requirements for ship design or ice class specific for ships traversing the Arctic Ocean. Prompted by the disaster of Exxon Valdez (1989), IMO started working on a unified code for navigation in polar waters to aim harmonize regulations for Arctic shipping in polar waters

- Guidelines for ships operating in Arctic ice-covered waters
  - In 2002, Marine Safety Committee (MSC) and the Marine Environment Committee (MEPC) approved Guidelines for ships operating in Arctic ice-covered waters (MSC/Circ.1056 – MEPC/Circ.399).
- Guidelines for Ships Operating in Polar Waters IMO Res. A1024(26): – Voluntary
  - applicable to new ships with a keel-laying date on or after January 1, 2011.
- Polar Code – Mandatory
  - IMO is currently developing a mandatory Polar Code, which supplements relevant regulations, including SOLAS and MARPOL, for ships operating in polar waters

Polar Code will address

- Construction provisions
- Damage control
- Equipment
- Safe return to port / Evacuation
- Human elements / Training
- Environmental protection
- Winterization
- Remoteness



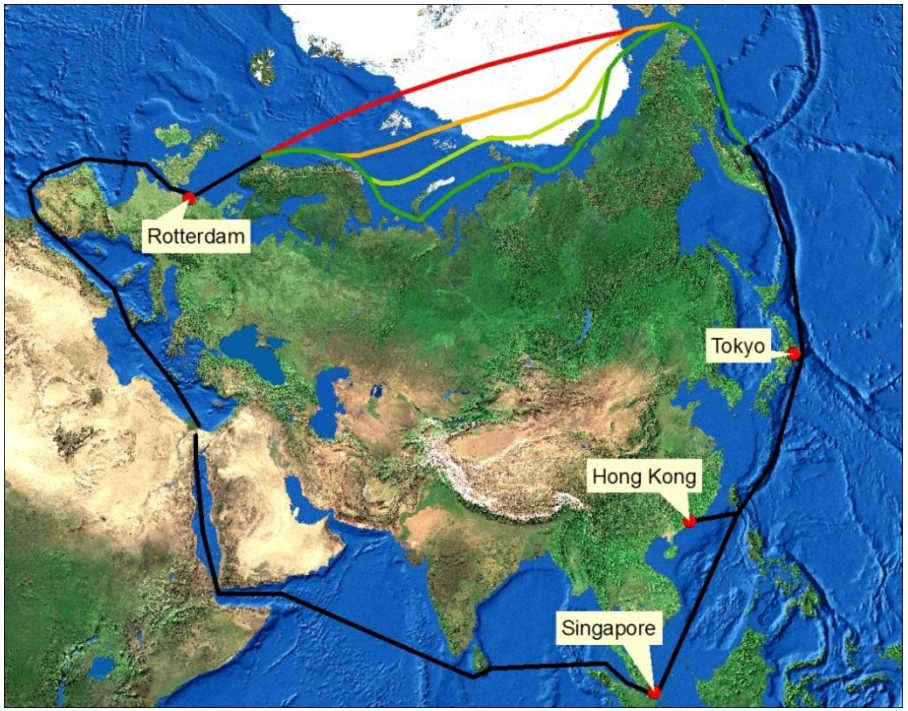

**Maximum extent of Arctic waters application**

# Shipping across Arctic Ocean - A feasible option in 2030-2050?

# Shipping across Arctic Ocean - A feasible option in 2030-2050?

- In 2030, part-year traffic from Tokyo hub will be competitive.
- In 2050, Tokyo hub will be profitable for part-year operation and may become profitable also with year-round sailing for bunker prices above $900/tonne.

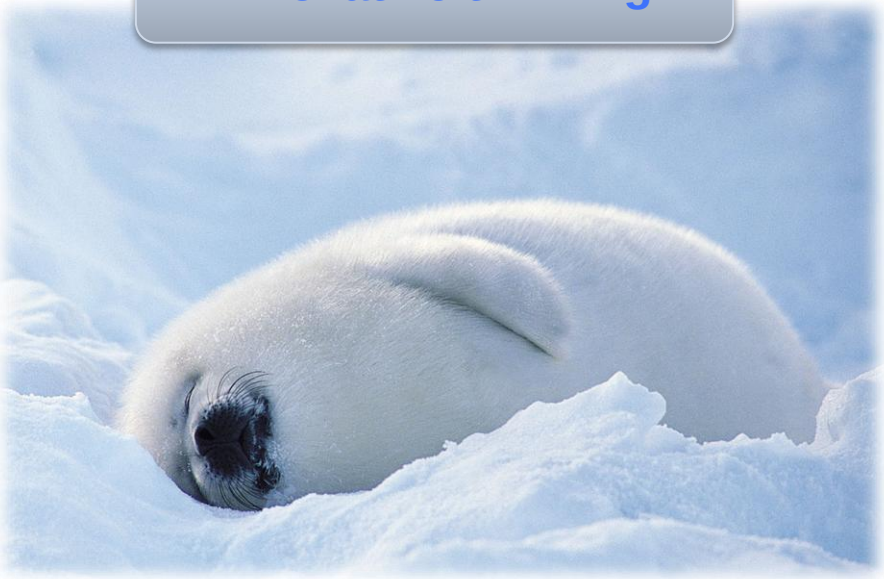
- Trans-polar shipping from central ports in Asia is likely to become marginally profitable only with high bunker prices and a long summer sailing season in 2050.
- Traffic across the Arctic from the southern ports in Asia (Singapore hub) will not be profitable due to a longer sailing route than via Suez.
- Using a trans-polar route may reduce global CO2 from ships by roughly 0.1% in 2030 and 0.15% in 2030 and 2050, respectively.



# DNV's Recommendations on arctic activities

- Innovative thinking on the design of Arctic vessels and offshore structures is needed to respond to arctic challenges for marine and offshore operations
- Extensive risk assessment to cover fisheries, tourism, extraction of natural resources as well as shipping and oil and gas developments should be carried out.

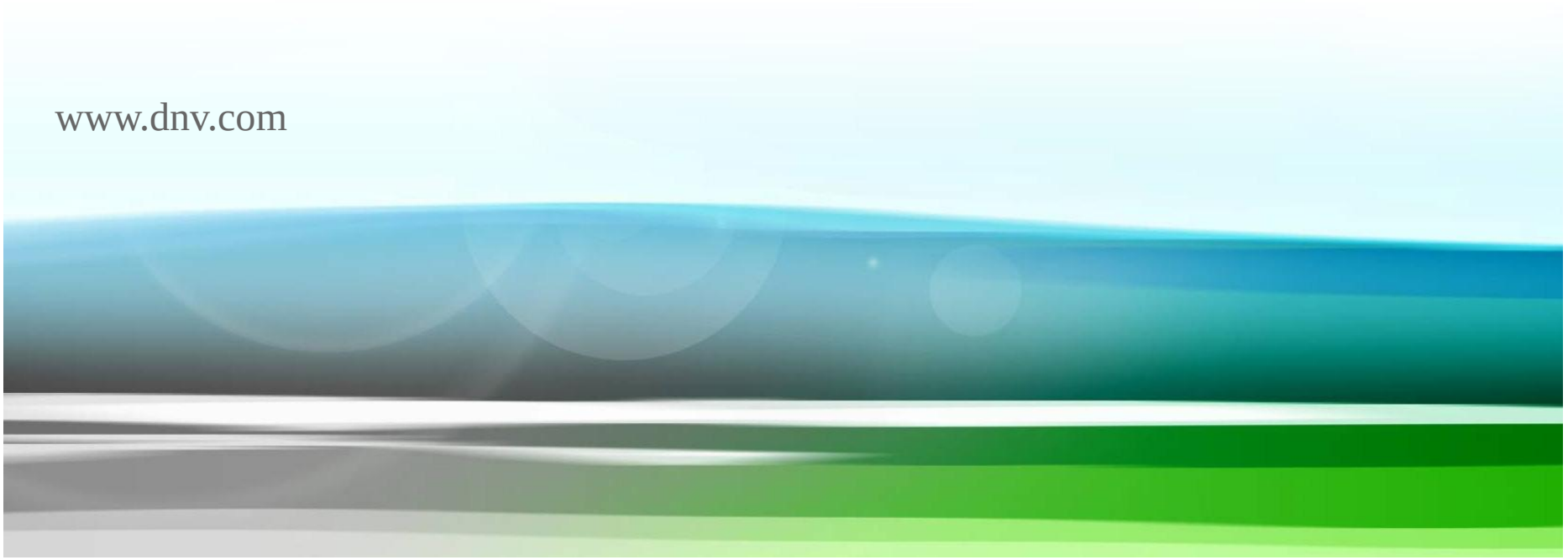
**Innovative thinking**



**Risk assessment**

# Safeguarding life, property and the environment

www.dnv.com





MANAGING RISK