OpenRisk II

(Kick-off Conference)

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Mapping ship related risk in Baltic waters - with focus on developing a new Sea-Ice risk module

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Interreg Baltic Sea Region

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SUSTAINABLE WATERS
OpenRisk II

Overall purpose of the ice module

- Incorporate the **differences** in probability for accidents and spills for ships sailing under **summer- and sea-ice conditions** in the Northern Baltic Sea and around Svalbard.

- Our goal is to **develop a new sea-ice navigation risk tool** for the Baltic sea and Svalbard, **but with possible application in other sea areas where sea-ice influences the risk picture.**

- Calculation of the **probability of accidents leading to oil spills, including probable spill volumes will be included.**

- The main aim of the tool is to support **<u>strategic</u> risk planning and management**.

First steps

- An **updated state-of-the-art evaluation** of the hazards and risks related to ship navigation in sea ice-covered areas.

- **The first step is a review of existing models** for the assessment of risk in sea ice-covered areas.
  - IMO Polaris
  - DNV COSSARC model
  - Valdez Banda et al. 2015, Lu et al. 2021, etc.

- **Gathering of relevant data** for the analysis of the risks in the focus areas (BSR and Svalbard)

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What data will be included in the development

- High-resolution AIS data for two years (2022 and 2023)
- Daily ice maps for 2022 and 2023
  - Finish Metrological Institute
  - Swedish Ice Service (SMHI)
  - Norwegian Metrological Institute (MET) and the Norwegian Polar Institute (NPI)
  - NOAH (USA)
  - U.S. National Ice Center
- Meteorological data for 2022 and 2023
  - Temperature, current, wind speed, waves etc.
- Ship specific data
- Historical incidents and accidents data

End result: To build a demo ship risk interface for the Baltic sea area for 2022/2023, including sea-ice navigation risk
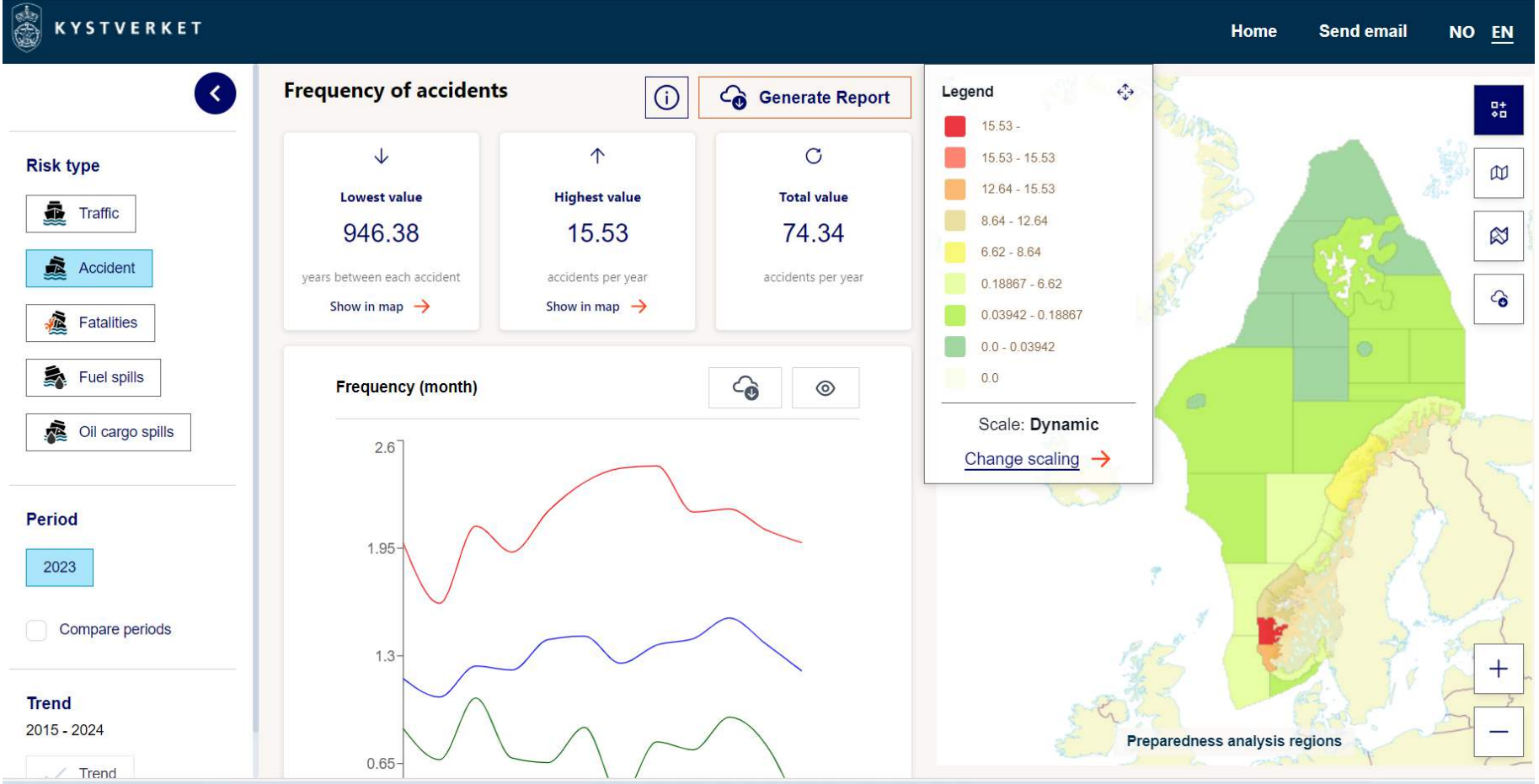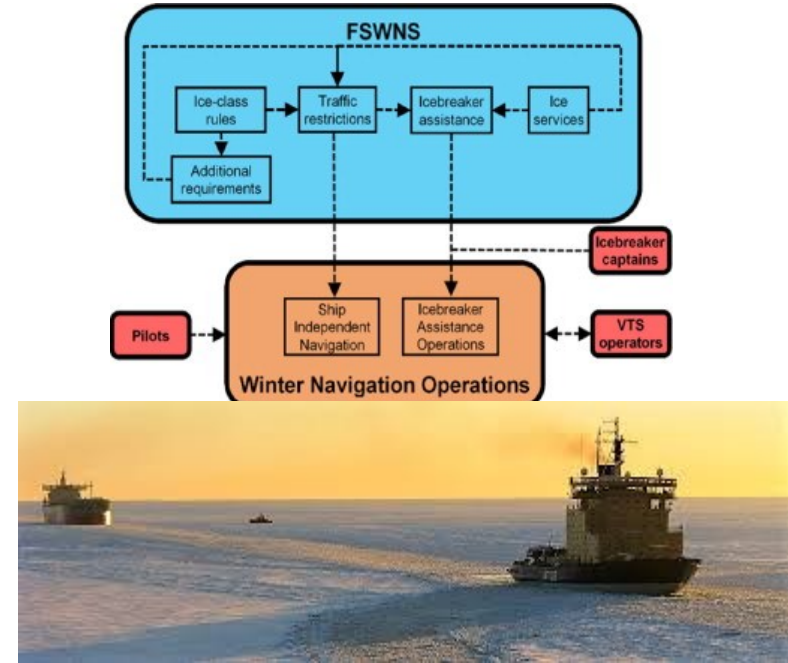
Representing the characteristics of navigation in sea ice-covered areas
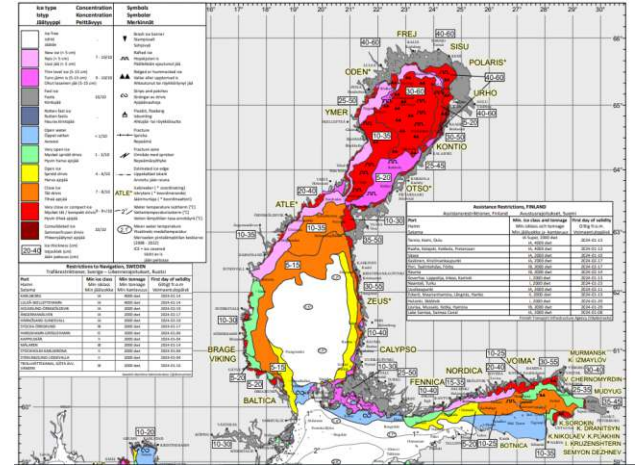
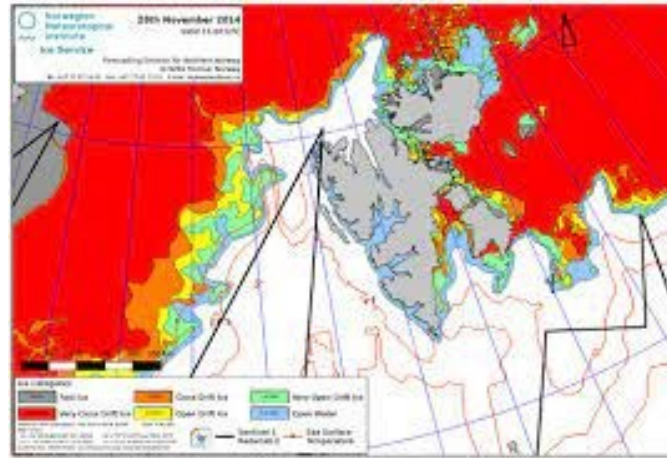# Winter Navigation in the NBS
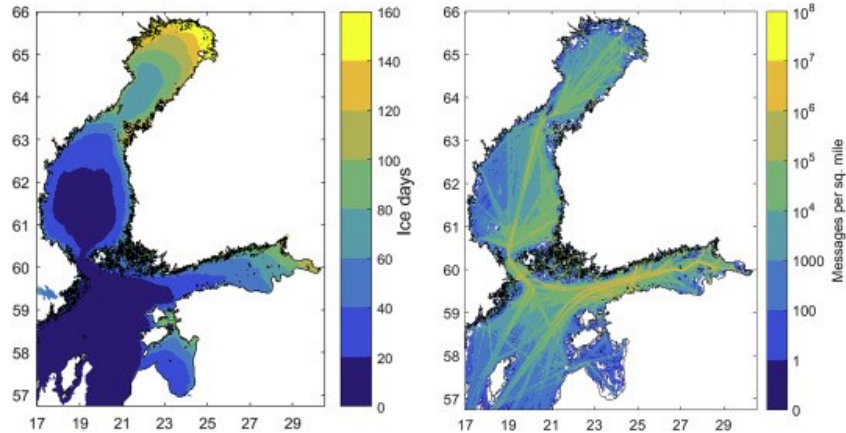
- Busy winter maritime traffic in ice

- Featured Finnish Swedish Winter Navigation System (FSWNS)

- Various ship operations in ice

Winter Navigation

Operations:

- Independent navigation
- Towing
- Escort
- Convoy
- Double convoy
- Cutting loose

Potential risks:

- **Collision**
- **Besetting**
  - Drifting/ grounding
  - Hull/Propeller damages

Risk of Collision

1 Traffic AIS data

Categorize →

2

Operation:
Independent navigation
Escort
Convoy
Double convoy
Cutting loose

AIS data
Ship specific database
Ice data
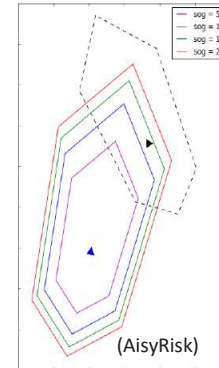Meteorological data

Learn data ↓

Alternatively

Simulation based approach
Some challeges to solve

Probability of a ship collision in ice

4

Collision risk calculation ←

Accident event database

3

Safety domain/
Safe distance

(AisyRisk)

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Risk of besetting

Spring   Summer   Autumn

Probability
0 - 0.00001
0.00001 - 0.00002
0.00002 - 0.00003
0.00003 - 0.00004
0.00004 - 0.00005

Ice concentration (%)
0 - 10
10 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 80
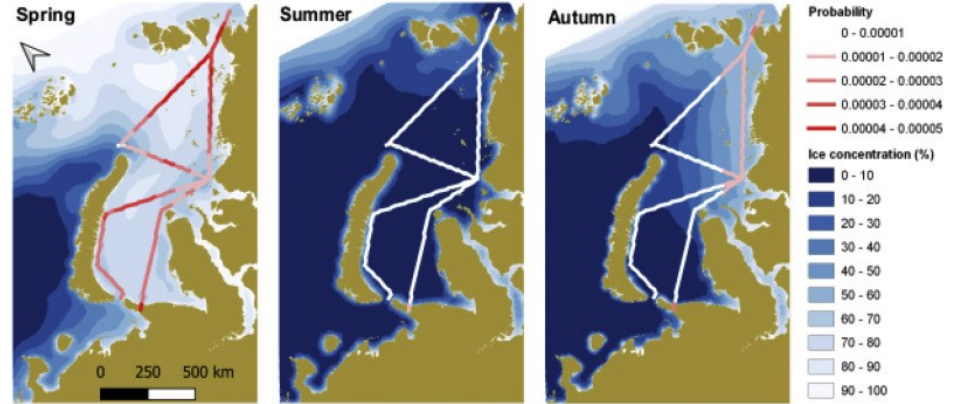80 - 90
90 - 100

AIS data

Vessel database

Ice concentration data

Besetting event database

A Bayesian analysis

0   250   500 km

(Vanhatalo et al., 2021)

AIS data

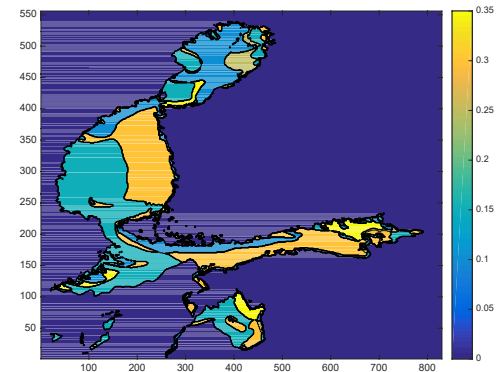*Ship specific database*

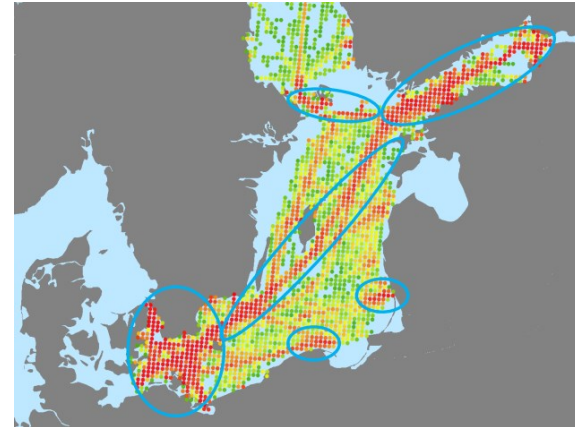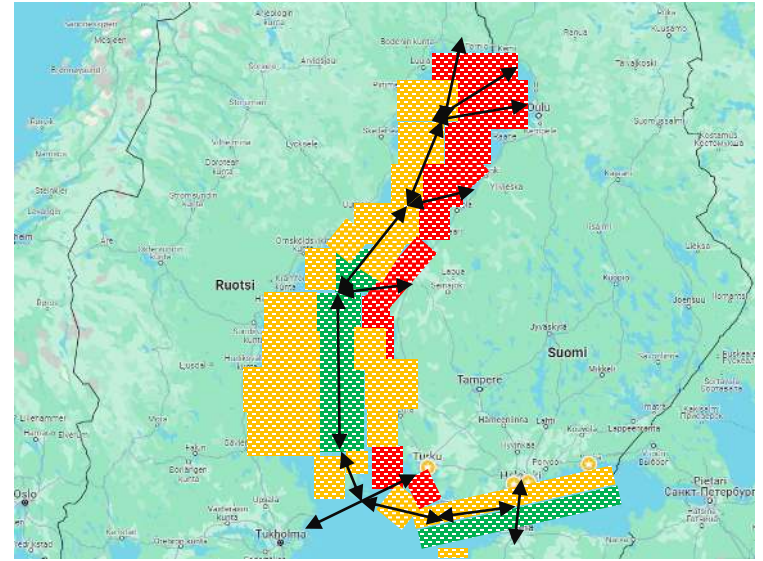*Complete Ice data*
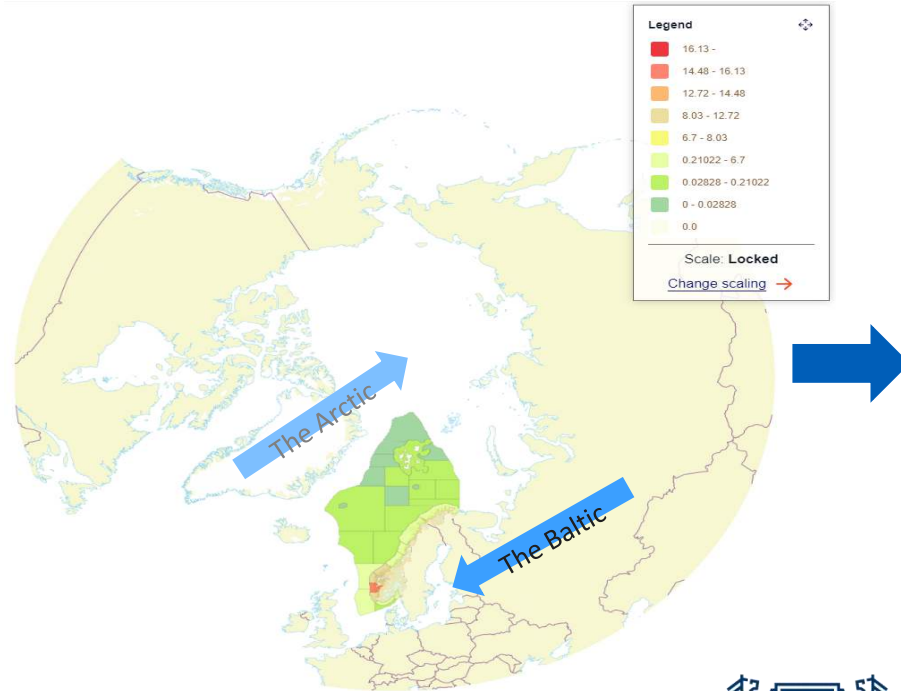
Environmental data

Besetting event database

Improved Bayesian approach

Probability of a ship becoming beset in ice

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Mapping Risks for Shipping in ice

Questions?

Thank you and welcome to our workshop tomorrow

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