

# SIMULATED SHIP OPERATIONS IN ICE

Navi-Trainer Professional 5000 (NTPRO 5000)

# What is NTPRO 5000?

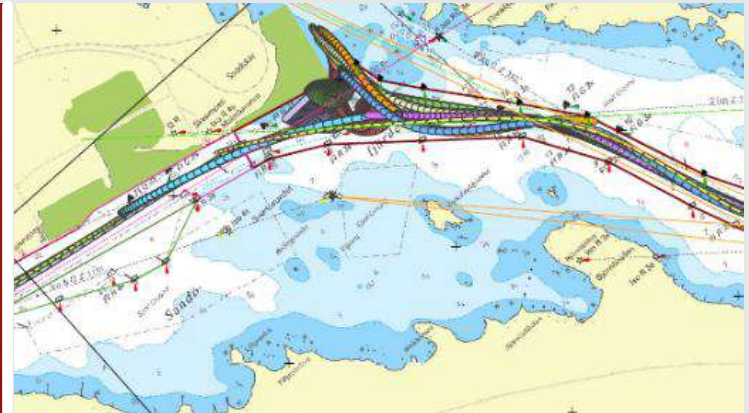
- 5th generation of the Navigational Simulation Platform for conventional STCW training, advanced operation specific training and R&D applications.
- Windows based network/client software package using COTS hardware infrastructure.
- Fully scalable solutions from online STCW training from the cloud up to full mission systems interconnected to other types of our and/or 3rd party simulators.
- The optimal simulation solution whether it is for generic or type specific ship's bridge operations.



STCW training



Operation specific training



Research & Development

**NTPRO 5000**

# Compliance with international standards and regulations

- International Convention of Training, Certification and Watch keeping for Seafarers (STCW 2010 including the Manila Amendments).
- IMO model courses.
- International SOLAS Conventions.
- Close cooperation with ClassNK on training and simulator development.
- Approved with class notations: INTEGRATED SIMULATOR SYSTEM, NAUT-AW(SIM), DYNPOS-AUT(SIM), HSC, TUG, ICE, AHTS to the Class A Standard for Certification of Maritime Simulators No. DNVGL-ST-0033 April 2018.
- The Nautical Institutes and OSVDPA requirements for Dynamic Positioning Simulators.
- Regulations concerning 'special' training: fishing operations, VTS operator training, etc.



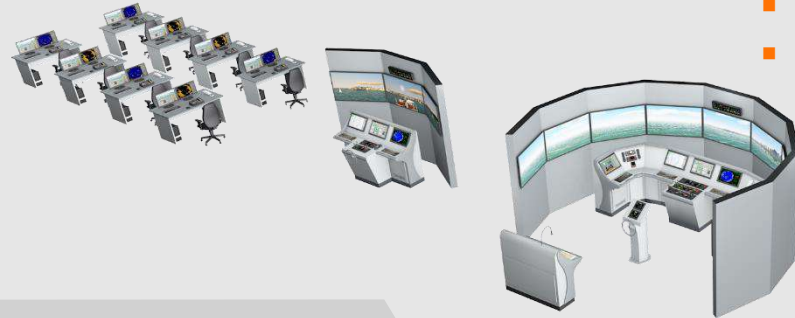
# TRAINING OBJECTIVE DEFINES THE SIMULATOR CONFIGURATION

## COMPUTER-BASED TRAINING

- Individual in-house or distance learning from the cloud
- Equipment familiarisation
- Self-examination and competence assessment
- Onboard training and assessment

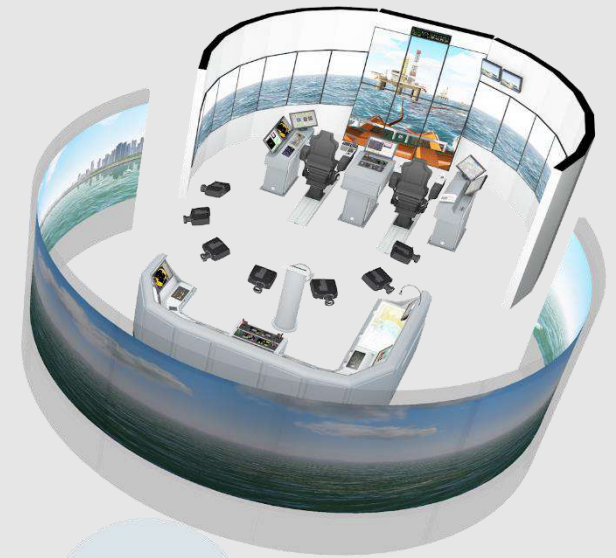
## NETWORKED CLASSES

- Interactive group exercises under instructor supervision



## FULL MISSION SIMULATOR

- Final training, assessment and certification
- Bridge Resource Management
- Pilot training
- Task rehearsals



## INTERCONNECTED SIMULATORS

- Crew resource management: **WHOLE SHIP** evolution training; Exercising communications between the bridge and engineering departments
- Operation resource management: interconnecting different types of Wärtsilä or 3rd party simulators to simulate a full operation, e.g. Oil Spill Response, Naval warfare, etc.



Cloud Based Simulation Solution

## INTEROPERABILITY

NTPRO 5000 is a flexible platform with powerful ethernet interfacing and intergration possibilities.

- Wärtsilä onboard equipment
- MFD
- ECDIS
- RADAR
- Wave
- BNWAS

- 3rd party simulator systems
- Military simulator systems
- Multi-manufacturer networks (EMSN)

DIS/  
HLA/  
Custom

**NTPRO  
5000**

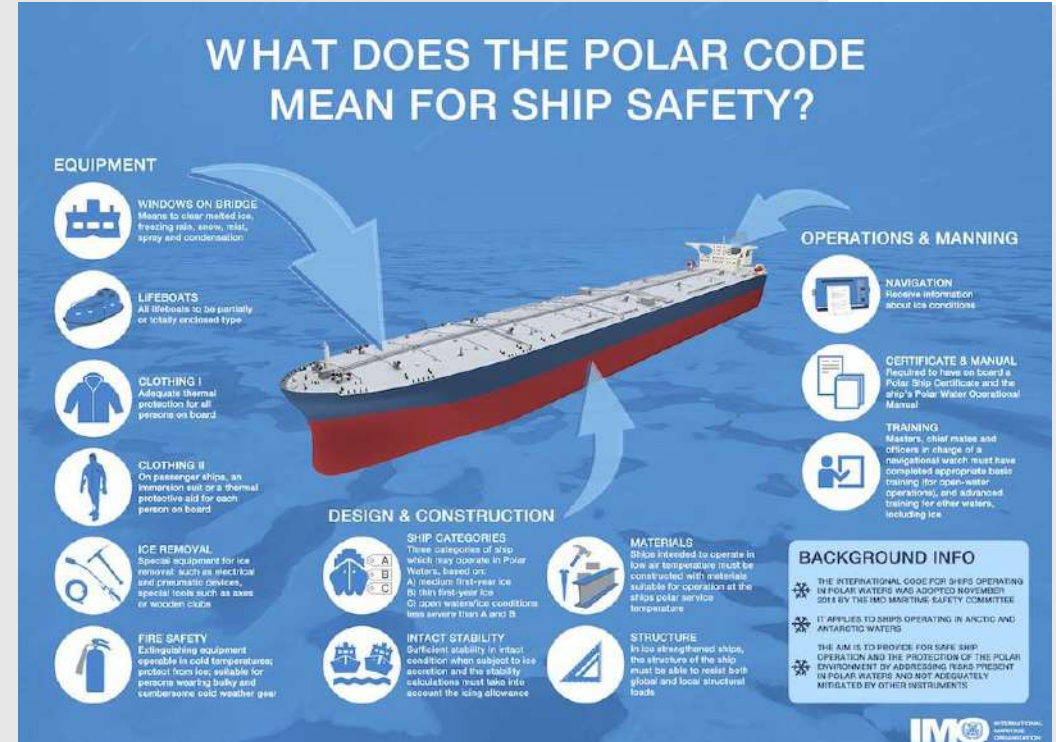
- Wärtsilä Simulators
- TechSim ERS
- PISCES
- GMDSS Simulator 5000

NMEA/Custom

- 3rd party bridge equipment
- Integrated bridge systems
- Dynamic positioning systems
- ECDIS
- RADAR
- Autopilot
- Controls/Indicators

## BACKGROUND/POLAR CODE

- Ice free waters are now expanding in the Arctic
- Mandatory international requirements for ships operating in polar waters (Polar Code), in force 1/2017
- New construction 1/2017, existing ships 1/2018
- Safety (SOLAS – new Chapter XIV)
- Environmental (MARPOL, various Annexes amended)
- Non-SOLAS ships to be considered next
- Ships in compliance will be issued a polar certificate
- Three main areas for compliance:
  - Equipment
  - Design & construction
  - **Operations and manning**



## STCW CONVENTION AND CODE

- STCW Convention and Code must be aligned with Polar Code.
- In force since 1/2018.
- Important points to consider:
  - HTW 2 agreed that the required service area would apply to experiences in areas considered equivalent to the polar area.
  - Certificate of proficiency will be required.
  - Certified training applies to seafarers working on board a ship subject to Polar Code.
- Course development – Full Ice course package with lesson plans, PPTs and simulator exercises is available.



# POLAR CODE MODEL COURSE DEVELOPMENT



## Basic Ice Navigation Course

- Awareness of environment: complexity, remoteness, changing factors.
- Risk assessment: introduction to operational risk management.
- Responsibility: introduction to risk management, ecological stewardship, regulations, construction requirements, communications.
- Ice navigation: recognition of conditions, instrumentation, chart coverage and projections and datum's, survey qualities, compasses, radar for positioning and for ice detection, A-to-B transit, alternate routing, SAR options, passage planning, marine communications, traffic monitoring, ice escort.



# POLAR CODE MODEL COURSE DEVELOPMENT



## Advanced Ice Navigation Course

- In-depth examination of Arctic environmental protection issues:
- Ice navigator proficiencies:
- **In-depth risk assessment:**

MARPOL on HFO vs LNG, emission control areas, Ballast Water management, anti-fouling, Special Areas and PSSA's and ATBA's, routing measures, mandatory ship reporting systems, marine mammal and seabird watch.

real-time tracking, rescue resources, emergency readiness, environmental forecasts, communications protocols, VTS, IACS Polar Class rules, routing and planning to match conditions to construction, hydrographic limitations, risk indexing systems.

**ice identifications, ice avoidance, partial ice concentration, position fixing, risk identification, A-to-B transit in various ice concentrations, use of open-water (polynya), finding leads, ice berg drift track, CPA's from bergs, ridges, pressure areas, growlers mixed in the ice edge, support for structures, ice management, etc.**

## COURSE DEVELOPMENT AND APPROVAL SUPPORT

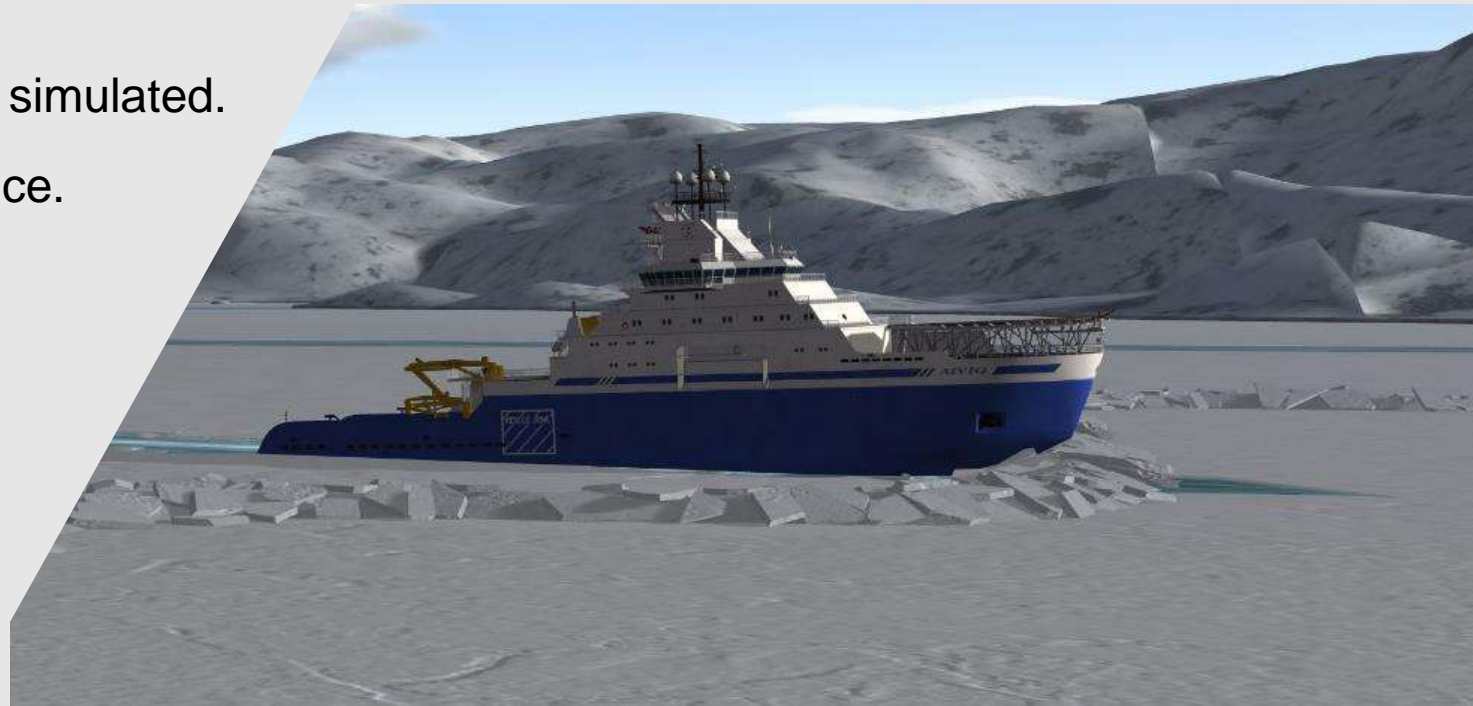
Wärtsilä can offer a full course package:

- Ice course design based on objectives and requirements
- Lesson plans with associated presentations and other teaching materials
- Simulator scenarios including objective assessment tool
- Administration and quality support
- Course and simulator approval support (Class society, local programs, etc.)
- Similar packages can be delivered for other types of training



## PRIMARY SIMULATOR FEATURES

- Automatic ice fields generation considering desired concentration, size, thickness, hardness, etc.
- Each piece of ice is simulated as 6 degrees of freedom floating rigid body connected to others.
- Ice ridges and hummocks are also simulated as semi-rigid bodies.
- Ship interacts with ice considering 3D hull and object shape, ice strength, friction coefficients, etc. Full 6 DOF motion in ice is simulated.
- Ice interacts with wind and currents.
- Different types and sizes of icebergs are simulated.
- Interaction between propeller wash and ice.



## TYPICAL SCENARIOS

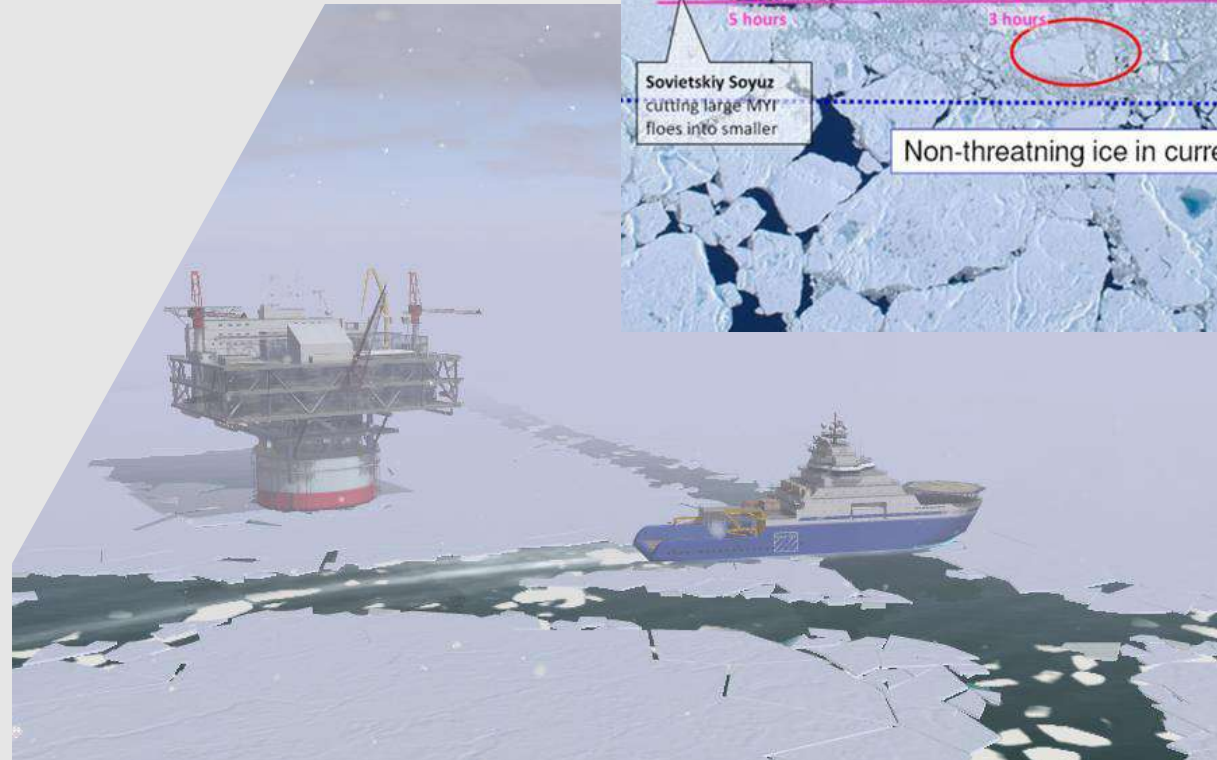
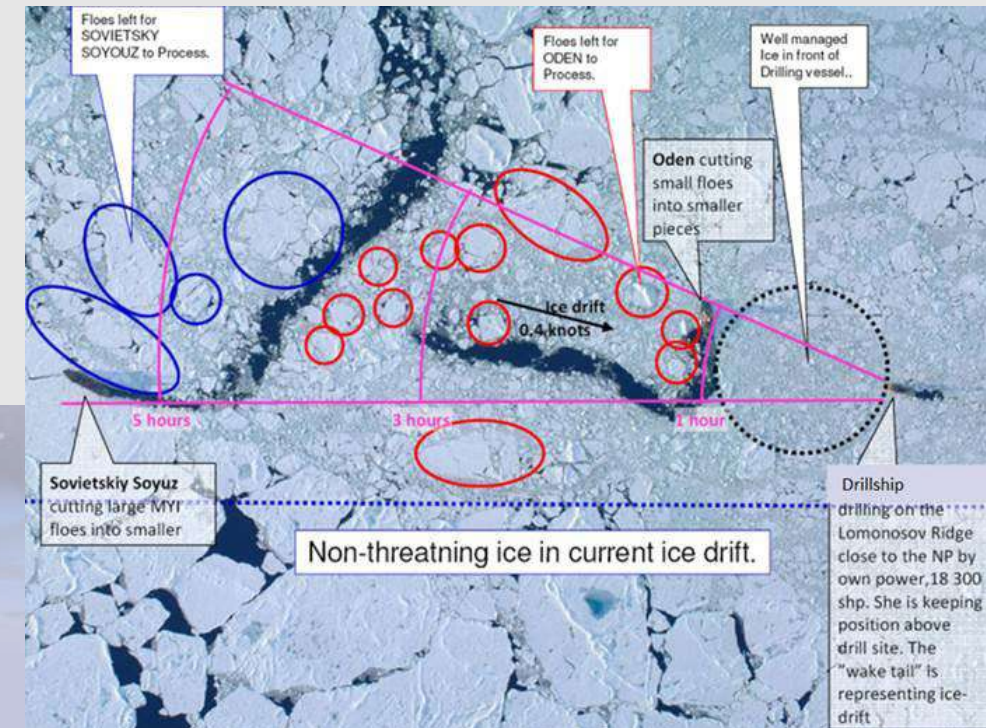
- Ice type identifications
- Ice avoidance
- Risk identification
- A-to-B transit in various ice concentrations
- Use of open-water (polynya)
- Finding leads
- Ice berg drift track & CPA's from bergs
- Ridges/Hummocks
- Growlers mixed in the ice edge
- Ice breaking support for structures
- Ice management



## ICE MANAGEMENT

Monitoring and breaking drifting ice into smaller floes and steering icebergs away from the protected object, e.g.:

- Oil and gas platforms
- Drill ships
- FPSOs
- SPMs
- other offshore structures



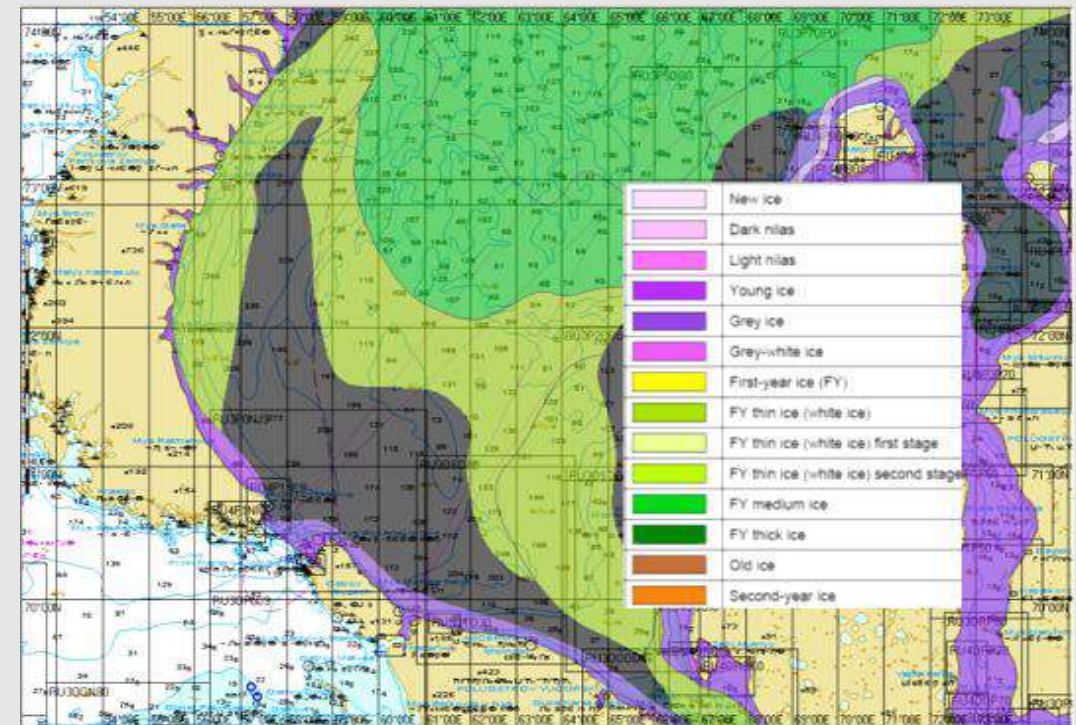
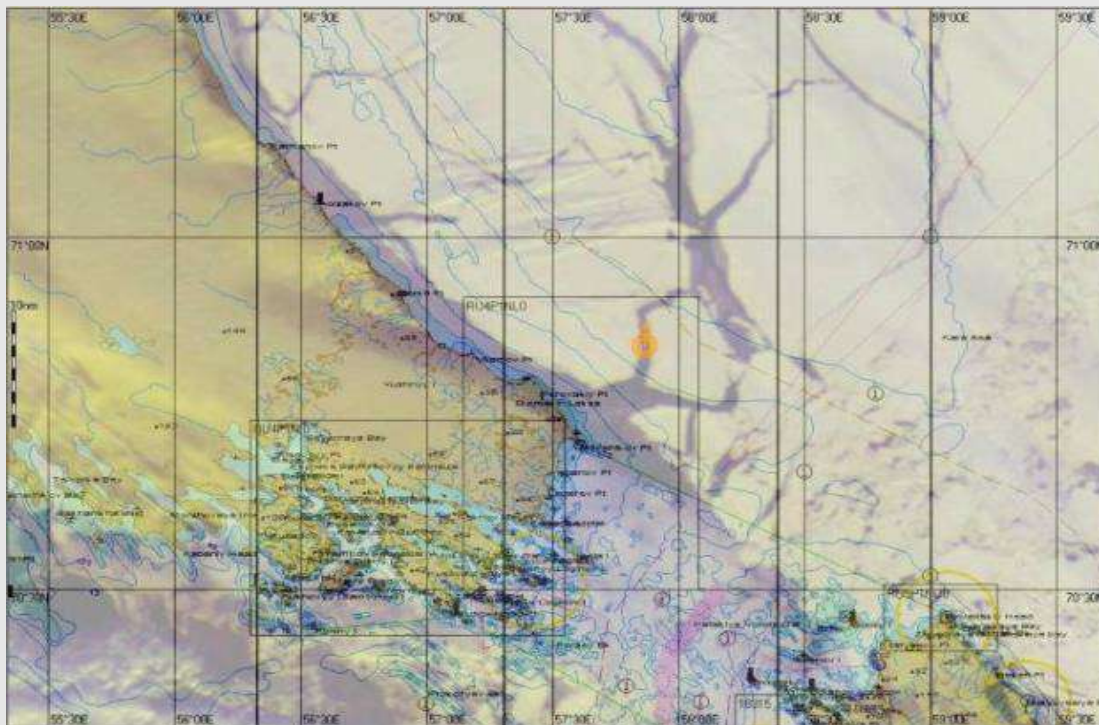
## USE OF ECDIS

- Presentation of Raster Images from satellites (Modis, NOAA, RadSat)
- Separate presentation of concentration, deformation and pressure layers
- Adjustable transparency for all ice data layers
- One click focus on ice chart
- One click focus on recommended route
- Ice chart auto-loading
- Support of national/international symbols (ice eggs)
- Animation for Forecast Ice data



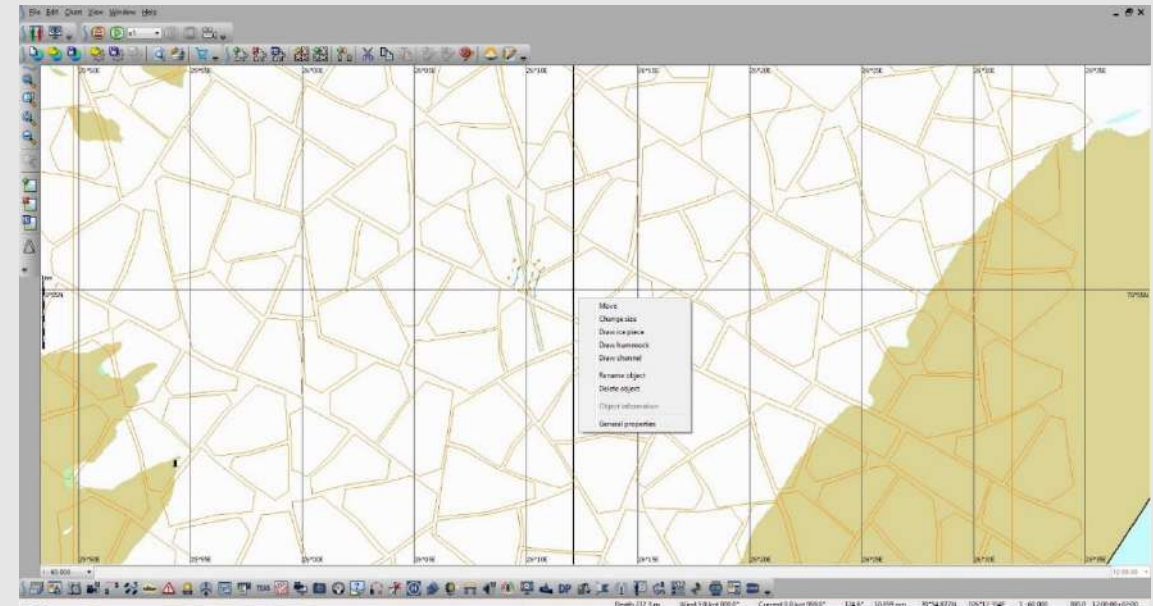
## USE OF ECDIS

- Analysis of weather and ice condition information
- Voyage planning in ice covered areas



## INSTRUCTOR TOOLS

- Automatic ice fields generation considering desired concentration, size, thickness, sigma value (hardness), etc.
- setting up ice ridges, channels, polynyas, stamukhas, etc.
- setting required drift speed depending on wind, current and other factors
- modifying ice friction for each vessel individually
- observing and log ice forces acting on vessels





THANK YOU





WÄRTSILÄ