

LEVERAGING DIGITAL TWIN OPPORTUNITIES FOR KEY SEA-ICE IMPACT SECTORS IN THE NORDIC AND BALTIC CONTEXT

NOrdic CryOSphere Digital Twin – NOCOS DT

Project duration: 2022–2024

Explore and pilot the digital twin technology opportunities and showcase how output from key initiatives like the Destination Earth (DestinE) Climate Adaptation Digital Twin (Climate DT) could be leveraged for key sea ice impact sectors in the Nordic and Baltic context.

In the longer term, deliver a major Arctic and Baltic contribution to the climate change information system developed by Climate DT, with cryosphere-related use cases at the interface between science and policy, in line with the overarching Destination Earth approach.

Marginal ice zone

(led by MetNO)

Marginal ice zone (MIZ) is a transitional zone between open sea and dense drift ice where many important physical and biological processes take place, such as marine primary production, nutrient supply to the euphotic zone, wave–ice interaction, and air–sea exchange of heat, water vapour and carbon. It is important for marine operations such as fisheries, polar tourism, oil and gas exploration, and other activities. Knowledge about the location, evolution and the statistical properties of the MIZ is critically important for safe operations in the Nordic countries.

Goal

Improved knowledge and regular monitoring and prediction of the MIZ in the Nordic seas, providing locations, weekly evolution and statistics.

Potential users

- Fisheries, offshore oil and gas industry, shipping and marine tourism companies who operate close to the sea ice edge.
- Research vessels for MIZ biological and ecological studies.

Models and data

- CMEMS operational reanalysis and forecast products including NEMO, TOPAZ4 and neXtSIM, as well as Norwegian high-resolution pan-Arctic coupled model NorHAPS
- Definition of criteria for the MIZ, and development of methods to derive MIZ properties from standard variables
- Calculation of probability of MIZ from existing data sources (e.g. Copernicus)

Developments

Python script for calculating the MIZ and its evaluation metrics will be published on github. A further development to describe the statistics of the MIZ and its weekly summary is in on the way, with the main purpose for navigation safeties.

Foreseen DestinE capabilities

MIZ locations, weekly evolution and statistics

Capabilities provided to DestinE

Provide reliable MIZ information on its distribution and weekly evolution, offer valuable information for the most common non-ice-strengthened and low-ice-class ships operating in the MIZ.

Key innovations

MIZ is a new parameter from sea ice and climate models.

Funding



Partners



Contact

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