

Seminar “Ocean, Ice and Atmosphere”,
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Environmental Forecasts and Navigation

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Due to retreating sea ice, ship traffic is increasing in Arctic waters. Several attempts were made to support navigation through the remaining sea ice. For example, merging of operational sea ice drift forecast and high-resolution synthetic aperture radar (SAR)-based sea ice maps to a dynamic ice map during the ARCWATCH-2 expedition of RV Polarstern in autumn 2024. However, information about the quality of sea ice predictions is usually not detailed enough to derive reliable statements for navigation.

We evaluate the sea ice drift prediction, contained in the forecast model data of TOPAZ and neXtSIM, operational available on the Copernicus Marine Service (CMEMS) in winter 2022/23 and 2024 towards their usability for advection and predicting deformation. We isolate linear kinematic features, investigate their scaling properties, and compare them to results derived from the entirety of measurements. We have found that the drift predictions from both Arctic models on CMEMS can be reasonably used for advection of ice type information, especially in the open ocean after the model upgrade in 2023. Nevertheless, deformation events relevant for navigation but small in scale cannot be predicted, as the spatial resolution of the models is too low.

We investigate the feasibility of operational use of the dynamic ice map in the Baltic Sea, using our own drift prediction, based on wind and ocean current forecasts from MET Norway and CMEMS, supported by contextual remote sensing data such as sea ice concentration and thickness.