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Dynamic Ice Map

Physics Based Merging of Sea Ice Information

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Due to retreating sea ice, ship traffic is increasing in Artic waters. Several attempts have been made to support navigation through the remaining sea ice, e.g. 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 in autumn 2024. However, the quality of these dynamic ice maps highly depends on the quality of the input products which is in general not published in sufficient detail.

We investigated the usability of sea ice drift prediction, contained in the forecast model data of TOPAZ and neXtSIM, for advection in winter 2022/23 and 2024. Both models are operational available on CMEMS. Moreover, we evaluated the scaling properties of isolated linear kinematic features (LKFs). We have found that the drift predictions provided by CMEMS can be reasonably used for advection of ice type information, especially at open sea after the model upgrade in 2023. Nevertheless, the spatial resolution is too low to predict deformation events like newly forming pressure ridges or open leads suitable for navigational purposes. Focusing on deformation events only, the power law scaling analysis of LKFs show large differences to traditional approaches. We suspect the power law scaling calculated with traditional approaches to be dominated by noise scaling.