



Dynamics of sea ice in the Baltic Sea and applications

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Sea ice forms in the Baltic Sea annually. Coastal and archipelago areas are covered by landfast ice, while further offshore the ice drifts under the influence of winds and currents. The length scale of the Baltic Sea basins is 100 km and the scale of the ice thickness is $\frac{1}{2}$ m, and the characteristics of the ice dynamics are similar to the ice dynamics in the polar seas. The drifting of the ice has major practical implications. First, the navigation conditions are determined by the ice extent, presence of leads and ice pressure, and therefore the dynamical behaviour of ice may cause rapid changes for them. Recent research has focused on ice kinematics scales, evolution of landfast ice zone, and downscaling of pressure from mesoscale models to ship scales. The length scale of dynamics depends on the ice thickness showing up in the stiffness of the ice and expansion of the landfast ice zone. Oil spills are in particular difficult in drift ice conditions, which has led to development of oil spill drift and dispersion models. This is most critical in the Gulf of Finland, a narrow and shallow basin with large oil terminals in the eastern side. The formation of sea ice ridges has important consequences in shallow basins since they ground to scour the bottom and form tie points for the expansion of the landfast ice.