Comparison of the main sea ice parameters received from satellite measurements and based on numerical simulation for the Baltic Sea region

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During the last decades remote sensing observations as well as modelling tools has been developed and become key elements of oceanographic research. One of the main advantages of both tools is a possibility of measuring large-scale areas.

The remote sensing measurements deliver only snapshots of the ice situation with no information about background conditions. Moreover, providing picture of the whole area requires sometimes combining various datasets that increases uncertainties. Modelling simulations provide full history of external conditions, but they also introduce errors that are the result of parameterizations. Also, an inaccuracy provided by forcing fields at the top and bottom boundaries are accumulated in the model.

In this work sea ice parameters such as sea ice concentration, thickness and volume obtained from both – satellite measurements and modelling has been compared. Numerical simulations were performed using standalone Community Ice Code (CICE) model (v. 6.0). It is a descendant of the basin scale dynamic-thermodynamic and thickness distribution sea ice model. The model is well known by scientific community and was widely used in a global as well as regional research, even operationally. The satellite derived ice thickness products were based on the C band HH-polarized SAR measurements originating from the satellites Sentinel-1 and RADARSAT-2. The sea ice concentration maps contain also visual and infrared information from MODIS and NOAA.

The ice extent, thickness and volume were compared in several regions within the Baltic Sea. Seasonal changes were analyzed with a particular attention to ice formation and melting time. The sea ice extent datasets were compatible. Inconsistencies were observed for the sea ice thickness delivered by satellite measurements, especially during the ice melt. The work presents direction for ignoring satellite data with an error related to ice melting that allows for excluding erroneous satellite maps and obtain reliable intercalibration.

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