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Verification of simulated sea-ice concentrations from sea-ice/ocean models using satellite data

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Sea-ice concentrations in the Laptev Sea simulated by the coupled North Atlantic – Arctic Ocean – Sea-Ice Model (NAOSIM) and Finite Element Sea-Ice Ocean Model (FESOM) are verified using sea-ice concentrations from AMSR-E satellite data and a polynya classification method for winter 2007/08. Simulated sea-ice fields from different model runs are compared with emphasis on the impact of an integrated fast-ice mask. Sea-ice models are not able to simulate polynyas realistically when used in their operational versions. Without fast ice, our investigations indicate that the simulation of large leads and smoothed sea-ice concentration fields compensates the absence of the polynyas. After implementation of a fast-ice mask the polynya location is realistically simulated, but the total open water area is largely overestimated. The study shows that further model improvements are necessary in order to achieve the important step from the simulation of large-scale features in the Arctic towards a more detailed simulation of smaller-scaled features (here polynyas) in an Arctic shelf sea.