# Ensemble sea ice forecast for predicting compressive situations in the Baltic Sea

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Forecasting of sea ice hazards is important for winter shipping in the Baltic Sea. In current numerical models the ice thickness distribution and drift are captured well, but compressive situations are often missing from forecast products. Its inclusion is requested by the shipping community, as compression poses a threat to ship operations. As compressing ice is capable of stopping ships for days and even damaging them, its inclusion in ice forecasts is vital. However, we have found that compression can not be predicted well in a deterministic forecast, since it can be a local and a quickly changing phenomenon. It is also very sensitive to small changes in the wind speed and direction, the prevailing ice conditions, and the model parameters.

Thus, a probabilistic ensemble simulation is needed to produce a meaningful compression forecast. An ensemble model setup was developed in the SafeWIN project for this purpose. It uses the HELMI multicategory ice model, which was amended for making simulations in parallel. The ensemble was built by perturbing the atmospheric forcing and the physical parameters of the ice pack.

The model setup will provide probabilistic forecasts for the compression in the Baltic sea ice. Additionally the model setup provides insight into the uncertainties related to different model parameters and their impact on the model results. We have completed several hindcast simulations for the Baltic Sea for verification purposes. These results are shown to match compression reports gathered from ships. In addition, an ensemble forecast is in preoperational testing phase and its first evaluation will be presented in this work.