



Operational wave forecasts in the Baltic: Ensembles or higher resolution?

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Operational wave models are limited by the available computational resources. Therefore it is important to estimate which improvement adds the most value to the skill of the forecast. This study aims at evaluating whether it is best to increase the horizontal resolution or to run ensembles within an operational wave model system in the Baltic.

The wave model used is the 3rd generation spectral wave model WAM Cycle4.5, forced by the regional numerical weather prediction model HIRLAM and the global ECMWF model. The basic setup is in 10 km horizontal resolution with 24 wave directions and 32 wave frequencies. Two improved setups are evaluated: 1) Similar configuration to the basic setup, but including 12 ensemble members with perturbed initial atmospheric forcing, thus sampling the uncertainty in the atmospheric forcing, and 2) The horizontal resolution is increased to 5 km and has 36 wave directions and 35 wave frequencies. Both improved setups require approximately a factor of 12 increase in computational effort compared to the basic setup. The evaluation of the performance of the three systems reveals that in shallow areas with complicated bathymetry improved horizontal resolution is important, while ensembles are important when the ocean depth is large.