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Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tides. It is sensitive to the changes in storm intensity, forward speed, size, angle of approach to the coast and the shape and characteristics of coastal features such as bays and estuaries. Along the coast, storm surge is often the greatest threat to life and property. In this study, the three-dimensional HBM model of DMI is used to conduct hindcast experiments in the Baltic Sea. Wind forcings from operational HIRLAM and its climatology version HIRHAM are used to examine their effects on surge predictions for several storm surge cases during 2002 and 2005. Moreover, the satellite altimetry and tide gauge sea level data are assimilated into the HBM model with Ensemble Optimal Interpolation (EnOI). The ensemble-based background error covariances are multivariate and inhomogeneous and can reflect the length-scales, the anisotropy and the covariability of mesoscale oceanic processes. The altimetry and tide gauge data are blended to account for both spatial
and temporal coverage. It is found that the assimilation is caple of statistically reducing the bias and root-mean-square error of sea level by 2-4 cm in the Baltic Sea. Comparisons with ICES temperature and salinity profiles show that the assimilation can decrease the RMSE of temperature and salinity by 0.3°C and 0.18 psu, respectively. In addition, the
assimilation run could outperform the free run for the next 24 hours forcasting.
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