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Augmenting an operational forecasting system for the North and Baltic Seas by in situ T and S data assimilation

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In order to improve the hydrography forecast of the North and Baltic Seas, the operational circulation model of the German Federal Maritime and Hydrographic Agency (BSH) has been augmented by a data assimilation (DA) system. The DA system has been developed based on the Singular Evolution Interpolated Kalman (SEIK) filter algorithm (Pham, 1998) coded within the Parallel Data Assimilation Framework (Nerger et al., 2004, Nerger and Hiller, 2012). Previously the only data assimilated were sea surface temperature (SST) measurements obtained with the Advanced Very High Resolution Radiometer (AVHRR) aboard NOAA's polar orbiting satellites. While the quality of the forecast has been significantly improved by assimilating the satellite data (Losa et al., 2012, Losa et al., 2014), assimilation of in situ observational temperature (T) and salinity (S) profiles has allowed for further improvement. Assimilating MARNET time series and CTD and Scanfish measurements, however, required a careful calibration of the DA system with respect to local analysis. The study addresses the problem of the local SEIK analysis accounting for the data within a certain radius. The localisation radius is considered spatially variable and dependent on the system local dynamics. As such, we define the radius of the data influence based on the energy ratio of the baroclinic and barotropic flows.

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