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Ocean temperature uncertainty forecast from 3-D super-ensemble modelling

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The super-ensemble technique optimally combines forecasts from several operational models with the aim to provide a single improved prediction of an environmental variable. Weights for the individual model forecasts are assigned after confrontation with available observations during a recent past learning period. In the oceanographic context characterized by sparsely distributed observations, the 3-D super-ensemble (3DSE) method has been developed. This method exploits a priori spatial error correlations to allow for the three-dimensional spatial variability of model weights over the whole ocean domain. The 3DSE method is evaluated for ocean temperature prediction using an extensive set of CTD and glider profiles, mooring data and satellite SST collected during the REP10 oceanographic campaign in the Ligurian Sea in August-September 2010. The overall forecast skills are shown to be improved compared to individual models and their Ensemble Mean (EM).
In addition, being a data assimilation procedure, the technique provides a posteriori estimates of the weight error covariances, which can be translated into the error covariances associated with the multimodel temperature forecast. The evaluation of the 3DSE uncertainty estimate during REP10 experiment is presented here. Issues concerning uncertainty validation and calibration will also be discussed.