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Monthly Temperature Ensemble Forecasts for the Baltic Sea: Features and Analysis

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In this work we explore the statistical features of monthly ensembles and their capability to predict physical phenomena in the Baltic Sea. Water temperature is profound factor for it affects in all phenomena in the sea. Temperature forecasts can be useful operationally for example in predicting ice conditions in winter time, which is of high relevance for example for maritime activities in the Baltic Sea.

The monthly ensembles were produced weekly by FMI's operational biogeochemical model, Baleco, by running it with 50 perturbed monthly weather scenarios from ECMWF. From this prediction system we obtain physical variables such as temperature, velocity and salinity, three chemical components and four biological components. In this study we concentrate on ensembles for the summer season.

Different statistical methods to diagnose the ensembles were studied. These methods include simple statistical parameters as mean, quartiles and minimum and maximum values, but also more sophisticated analysis tools as rank histograms, which have been used as an established practice in meteorology. With these methods it is possible to obtain overall picture of the quality of the forecasts.

In this work we analyse different time spans and their quality in forecasting. We also take a look at some more specific physical features such as upwelling and investigate the monthly ensemble behaviour in prediction of these phenomena. One challenge in statistical forecasting is how to convey uncertainties to the end-user in easily comprehensive manner. Bearing this in mind we also discuss the communicational aspects of ensemble forecasting.