Short-term ocean ensemble forecasting as derived by surface wind perturbations; method evaluation and seasonal cycle of the ocean forecast uncertainty.

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A new methodology is being devised for ensemble ocean forecasting using distributions of the surface wind field derived from a Bayesian Hierarchical Model (BHM). The ocean members are forced with samples from the posterior distribution of the wind during the assimilation of satellite and in-situ ocean data. The initial condition perturbations are then consistent with the best available knowledge of the ocean state at the beginning of the forecast and amplify the ocean response to uncertainty only in the forcing.

The ECMWF Ensemble Prediction System (EPS) surface winds are also used to generate a reference ocean ensemble to evaluate the performance of the BHM method that proves to be effective in concentrating the forecast uncertainty at the ocean meso-scale.

A one-year long experiment of weekly BHM ensemble forecasts was performed in the framework of the operational Mediterranean Forecasting System. The statistical properties of the ensemble are compared with model errors throughout the seasonal cycle proving the existence of a strong relationship between forecast uncertainties due to atmospheric forcing and the seasonal cycle.