ENSURF: Multi-model sea level forecast. Implementation and validation results for the IBIROOS and Western Mediterranean regions

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Abstract

ENSURF (Ensemble SURge Forecast) is a multi-model application for sea level forecast that makes use of several storm surge or circulation models and near-real time tide gauge data in the region, with the following main goals:

- providing easy access to existing forecasts, as well as to its performance and model validation, by means of an adequate visualization tool

- generation of overall probabilistic forecasts of sea level, including confidence intervals, by means of the Bayesian Model Average technique (BMA)

The Bayesian Modelling Average technique generates an overall forecast probability density function (PDF) by making a weighted average of the individual forecasts PDF's; the weights represent the Bayesian likelihood that a model will give the correct forecast and are continuously updated based on the performance of the models during a recent training period. This implies the technique needs the availability of sea level data from tide gauges in near-

real time. The system was implemented for the European Atlantic facade (IBIROOS region) and Western Mediterranean based on the MATROOS visualization tool developed by Deltares. Results of validation of the different models and BMA implementation for the main harbours are presented for these regions, where this kind of activity is performed for the first time. The system is currently operational at Puertos del Estado and has proved to be useful in the detection of calibration problems in some of the circulation models, in the identification of systematic differences between baroclinic and barotropic models for sea level forecasts and to demonstrate the feasibility of providing an overall probabilistic forecast, based on the BMA method.