Recent developments in the forecasting chain at Arpae-SIMC for the Emilia-Romagna (Northeast Italy) coastal areas

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INTRODUCTION

The Hydro-Meteo-Climate Service of the Agency for Prevention, Environment and Energy of Emilia-Romagna (Arpae-SIMC) implements and constantly updates its operational forecasting chain to provide the regional Civil Protection Agency daily forecasts for the region's coastline. Previous scientific publications have described the operational procedures with the current work intending to contribute with the recent oceanographic and coastal modelling developments.

METHODS

The forecasting chain begins with two implementations of a meteorological model (COSMO-5M and COSMO-2I), with the outputs forcing the oceanographic (ROMS) and sea-state (SWAN) applications. Outputs in terms of sea level and wave parameters are then used to run the morphodynamic model XBeach that provides an estimation of flooding conditions through Storm Impact Indicators (SIIs) in a fully deterministic framework. New advancements involve a coupled oceanographic-wave model (Adriac) nested in the Copernicus Mediterranean Forecasting System (MFS) and multi-model ensemble outputs forcing XBeach on a (semi-) probabilistic approach.

RESULTS AND CONCLUSION

Results of the new oceanographic approach improved mostly the tidal residues in the Adriatic basin. The (semi-)probabilistic approach for the coastal modelling component allowed for more simulations to be conducted and an incipient estimation of forecast uncertainties for two 1-D profiles in the region's littoral. Hitherto, updates towards state-of-the-art numerical modelling applications have been proven fundamental on ameliorating the forecasting outcomes.