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An operational coupled wave-current forecasting system for the northern Adriatic Sea

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Since 2005 an Adriatic implementation of the Regional Ocean Modeling System (AdriaROMS) is being producing operational short-term forecasts (72 hours) of some hydrodynamic properties (currents, sea level, temperature, salinity) of the Adriatic Sea at 2 km horizontal resolution and 20 vertical s-levels, on a daily basis. The main objective of AdriaROMS, which is managed by the Hydro-Meteo-Clima Service (SIMC) of ARPA Emilia Romagna, is to provide useful products for civil protection purposes (sea level forecasts, outputs to run other forecasting models as for saline wedge, oil spills and coastal erosion).
In order to improve the forecasts in the coastal area, where most of the attention is focused, a higher resolution model (0.5 km, again with 20 vertical s-levels) has been implemented for the northern Adriatic domain.
The new implementation is based on the Coupled-Ocean-Atmosphere-Wave-Sediment Transport Modeling System (COAWST)and adopts ROMS for the hydrodynamic and Simulating WAve Nearshore (SWAN) for the wave module, respectively.
Air-sea fluxes are computed using forecasts produced by the COSMO-I7 operational atmospheric model. At the open boundary of the high resolution model, temperature, salinity and velocity fields are provided by AdriaROMS while the wave characteristics are provided by an operational SWAN implementation (also managed by SIMC). Main tidal components are imposed as well, derived from a tidal model.
Work in progress is oriented now on the validation of model results by means of extensive comparisons with acquired hydrographic measurements (such as CTDs or XBTs from sea-truth campaigns), currents and waves acquired at observational sites (including those of SIMC, CNR-ISMAR network and its oceanographic tower, located off the Venice littoral) and satellite-derived wave-heights data.
Preliminary results on the forecast waves denote how, especially during intense storms, the effect of coupling can lead to significant variations in the wave heights.
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