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Validation of Adriac, the new coupled wave-ocean forecasting system for the Adriatic Sea of Arpae-SIMC

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The coastal forecasting system of the Emilia-Romagna region managed by Arpae-SIMC is composed by a chain of meteorological, oceanographic, wave and coastal numerical models. They provide the regional Civil Protection Department with weather and marine forecasts and they are used to issue weather, marine and coastal warnings. The main variables taken into account for the evaluation and the issue of coastal warnings are the sea level and wave height along the coast.

The actual operational forecasting marine suite is composed by the oceanographic model AdriaROMS and the wave model SWAN-MEDITARE. AdriaROMS is an implementation of the Regional Ocean Modeling System (ROMS) for the Adriatic Sea and forecasts sea level, temperature, salinity and currents, while SWAN-MEDITARE is the implementation of the Simulating WAves Nearshore (TU Delft) run over a cascade of nested domains at increasing horizontal resolution, from the Mediterranean to the regional domain, passing through the Italian domain.

An update version of the marine-coastal chain is now running in pre-operational mode. The new model Adriac is an implementation of the Coupled-Ocean-Atmosphere-Wave-Sediment Transport Modeling System (COAWST), which couples ROMS with the wave model SWAN for the Adriatic Sea.
Adriac is characterized by an horizontal resolution of 1 km and a vertical resolution of 30 terrain following levels, with a minimum positive bathymetry of 1.5 m. The model is driven at the southern boundary by sea level, currents, temperature and salinity computed by the Copernicus Mediterranean Ocean Forecasting system (MFS) and it is forced at the sea surface by the fields of the atmospheric model COSMO. 48 rivers along the Adriatic basin are modelled considering their updated climatology whereas for the Po river, whose delta has been divided in 11 branches, quasi-real time flow rate data are used. Tidal forcing includes 8 astronomical tidal components (K2, S2, M2, N2, K1, P1, O1, Q1) interpolated using OTIS Software.

With respect to the actual operational ocean model the upgrade to Adriac includes horizontal and vertical resolution, the coupling between ocean and wave, the revision of the rivers climatology, atmospheric and boundary fields and the tidal forcing. Results and performances of the validation phase of the new model Adriac will be presented.