The Coastal Wave Forecasting System: evaluation of the first year of activity

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The Mediterranean Coastal WAve Forecasting (MC_WAF) system is operative at ISPRA since September 2012. The system is based on a chain of nested models (WAM, SWAN) running in the Mediterranean Sea. Ten regional areas are presently nested in the Mediterranean grid at 1/60 degree resolution, covering the Ligurian, Tyrrhenian, Sardinian, Ionian and Adriatic Sea. In the Tyrrhenian Sea 5 small coastal areas are nested in the regional grid, producing 1/240 deg resolution medium-term coastal forecasts in the lower Gulf of Genoa, near the Elba Island and the Giglio Island, in the Gulf of Terracina and in the Gulf of Neaples. The system works with the wind produced by the ISPRA meteorological system (SIMM-BOLAM) at 1/10 deg resolution. The bathymetries in use have been obtained merging information from the GEBCO dataset, the digital maps produced by the Italian Hydrographic Service (IIM), and from some high resolution local dataset available in the coastal areas. Before the implementation of the coastal system, the numerical methodology had been extensively tested in several shallow-water areas over more than 50 case studies. In building the operational system the results were useful not only for the local parametrization of the coastal processes, but also for making optimal use of the nesting techniques and for the selection of the regional and coastal areas. The wind and wave forecasts in the first year of activity have been compared with the available meteo-marine data provided by the buoys of the Italian National Wave Network (RON), and the results are here shown and discussed. Finally, the coastal forecasts have been used to evaluate the monthly and seasonal wave energy fluxes, leading to a preliminary estimate of the wave power in some morphologically complex coastal areas. After the first year of activity the system is now being upgraded, extending the regional areas to completely cover the Adriatic Sea, the Sicily Channel and the Ionian Sea. Based on the results of previous studies, it seems entirely possible that the presently available wind will not be accurate enough to give completely reliable wave forecasts in the new regional areas. The use of a non-hydrostatic, very high resolution meteorological model (MOLOCH) is now being tested in order to improve the quality of regional and coastal forecasts. The new chain of models will be presumably made operational before the next autumn season. The use of MFS currents in the Sicily Channel is also being investigated in view of the future implementation in the operational system.