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Towards a new BOLAM-MOLOCH chain: Forecast evaluation over the MAP D-PHASE DOP and HyMeX SOP

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Since the beginning of the year 2000, an integrated meteo-marine forecasting chain called *Sistema Idro-Meteo-Mare* (SIMM) is operational at the Institute for Environmental Protection and Research (ISPRA). The SIMM forecasting system is based on a cascade of four numerical models, telescoping from the Mediterranean basin to the Venice Lagoon and it is initialized by means of 50-km ECMWF analyses and forecasts. Into the SIMM chain, it is also integrated, in a research configuration, a hydrological model over two Italian river basins.

Within the SIMM verification programme, the different components of such forecasting system have been regularly assessed through subjective and objective methodologies. Such verification activity has been mainly focused on the meteorological model at the base of the chain, namely a 11-km BOLAM covering the entire Mediterranean basin, aiming at improving the forecast quality through both updating its numerical code and improving its configuration inside the SIMM forecasting system.

After a major increase of the BOLAM performance achieved this way in 2009, a massive “reforecast” campaign has been recently carried out with the purpose of identifying the best way to further improve the forecasting chain. Five reforecast datasets (experiments) have been defined over the MAP D-PHASE Operations Period (DOP), June to November 2007, by combining in different way the following model settings: horizontal grid spacing, domain extension, initial and boundary conditions, nesting design and the BOLAM code version. A general indicator of the experiments’ performance has been provided by the assessment through a multi-method verification approach of the corresponding quantitative precipitation forecasts (QPFs) against the rainfall observational measurements collected for the DOP activities.

Results have evidenced that decreasing the BOLAM grid step (up to 7.8 km), increasing its domain extension (covering an area from 54°N to 25°N and from 18°W to 43°E) and using a 15-km ECMWF data package “upgraded” with respect to the one currently employed are effective in improving the QPF quality. This has brought to the definition of an “optimal” new BOLAM configuration that will be shortly implemented into the SIMM forecasting chain. In the meantime, such “optimal” configuration, coupled over the central-northern Italy to the non-hydrostatic 2.5-km MOLOCH model, has been employed and tested in an operational asset during the Special Observation Period (SOP), September to November 2012, of the international initiative “HyMeX – HYdrological cycle in the Mediterranean EXperiment”.

A preliminary, subjective verification of the BOLAM-MOLOCH chain for the HyMeX SOP is presented here, together with a panoramic of the objective results associated to the above-mentioned BOLAM reforecast experiments evaluated over the MAP D-PHASE DOP.