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Using the MAP D-PHASE database to evaluate the QPF improvements of the new SIMM's BOLAM

S. Mariani and M. Casaioli

Institute for Environmental Protection and Research (ISPRA), Department for Inland and Marine Waters Protection, Rome, Italy (stefano.mariani@isprambiente.it)

The improvement of weather forecasts is one of the primary goals of any meteorological, hydrological or environmental institution running a numerical weather prediction (NWP) model. Weather predictions can be improved, for instance, by implementing more accurate and advanced physical parameterizations of processes that occur below the grid scale resolved by the model under investigation. To statistically evaluate such performance improvements, it is necessary to intercompare, over a long time period, forecasts obtained by the original model version against forecasts obtained by using the improved version.

This is the case of the present study that provides the performance results in terms of quantitative precipitation forecast (QPF) of the new and updated implementation of the meteorological BOlogna Limited Area Model (BOLAM), which is at the base of the integrated meteo-marine forecasting chain called Sistema Idro-Meteo-Mare (SIMM) operational since 2000 at the Institute for Environmental Protection and Research (ISPRA, former APAT). The QPF improvements are evaluated with respect to corresponding verification results obtained with the precipitation fields modelled using the previous NWP implementation, referred as QBOLAM.

The long-time database employed is the one obtained during the WMO-WWRP Demonstration project MAP D-PHASE: Rain gauge measurements were indeed collected over the D-PHASE Operations Period (DOP; Jun.-Nov. 2007) from several regional and national networks available over the Alpine area and Central Western Europe. In addition, for selected case studies precipitation fields retrieved from the radars were also available over the target areas. The two forecast series verified is the one originally delivered during DOP (QBOLAM series) and the one reforecast using the new and updated NWP implemented within the SIMM chain (BOLAM series).

A multi-method approach is applied to assess the QPF improvement. Such approach is based on a power spectrum analysis to assess difference in terms of (small) scale-details between BOLAM and QBOLAM forecasts, the computation of traditional categorical scores, a visual investigation on how contingency table's elements are spatially located over the verification domain, and the calculation of the ROC diagrams at different thresholds. The performances of the two model versions have been also investigated by means of objected-oriented/spatial techniques with respect to selected meteorological intense events occurred over the Alpine area during DOP.