



## **Sensitivity experiments of a severe rainfall event in north-western Italy: 17 August 2006**

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This study is embedded into a wider project named “Tackle deficiencies in Quantitative Precipitation Forecast (QPF)” in the framework of the COSMO (CONsortium for Small-scale MOdelling) community. In fact QPF is an important purpose of a numerical weather prediction model, for forecasters and customers. Unfortunately, precipitation is also a very difficult parameter to quantitatively forecast. This priority project aims at looking into the COSMO model deficiencies concerning QPF.

A first step was the attempt to get a better description of the COSMO problems related to precipitation. An assessment of the existing verification results from all the partners resulted in a first list of test cases. In order to ensure that the observed COSMO model problems were not due to an old version of the model or a specific implementation, the test cases were rerun with a COSMO model reference version. The test cases, for which the COSMO model reference version reproduced the QPF deficiencies, constituted a final list of test cases recommended for sensitivity studies. A set of sensitivity studies concerning data assimilation, numerics, physics and initial conditions was prepared. The list includes about 25 studies that were performed for all dates included in the final list of test cases.

The test case here described considers a severe rainfall event, which affected the Toce, Ticino and Sesia catchments (northern part of Piemonte, at the border with Switzerland) during 17-18 August 2006. The event was mainly convective in nature and characterized by the occurrence of intense deep moist convection leading to relevant rainfall depths for both short and long durations. Then, it is really of interest, both for meteorological and hydrological communities, to assess the performances of COSMO model in the description of the spatio-temporal evolution of this event which occurred

in an area with very complex orography. The results of the numerical experiments are compared in terms of peak and mean rainfall depths over the catchments both for short duration (6 hours) and long duration (24 hours), and then compared with the operational run of COSMO-LAMI (the Italian implementation of the COSMO model).

The analysis of the results helps in giving a more precise idea about the model parameters, about what parts of the model need to be reformulated in order to improve the QPF and about the scales which can be actually solved by the model.