5.9 ASSIMILATION OF DIFFERENT RADAR DATA FOR A BETTER FORECASTING OF SEVERE WEATHER PHENOMENA

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One aspect of climate change is the modification in frequency and characteristics of severe weather phenomena, which makes them less predictable in occurrence and effects. In order to address this issue, meteorological centers in charge of regional forecasts are investing to upgrade their capability of nowcasting and short-term forecasting of such events. When dealing with fast, intense and very localized phenomena the integration of proper, often heterogeneous, real-time measurements with high-resolution model simulation is at the moment the most promising mean to catch and follow the evolution of critical events.

In this context, for a few cases of severe weather in Tuscany, we show the results of assimilating local data in a limited area model configured for operational forecasts of central Italy. The main focus is on the impact of radar observations from different systems operating in different bands and their added value with respect to assimilating data from available ground-stations and radiosoundings. The adopted local area model (LAM) is based on the WRF code, with the WRF-DA assimilation scheme in a 3DVar configuration and an architecture that allows a rapid refresh of the model (every 3h) with the assimilation of new observations, in order to provide high-resolution forecasts, in view of operational nowcasting of intense precipitation events. In-situ data are from the regional sensor networks (about 800 stations), while radar data are from different systems, namely a S-band radar in Corse, three X-band radars in Tuscany and the C-band composite of the Italian radar network. The different impacts on the model simulations are analysed for the data coming from different types of radars and their combination.

The preliminary results show a significant impact from the assimilation of local ground weather stations and radar data in correcting the space and time localization of the precipitation, and its rate, with respect to the non-assimilated simulations. We also investigate on which extent the heterogeneity of the available data, specifically of the radar systems operating at different frequencies, can bring complementary information on the precipitation phenomenology and its horizontal and vertical distribution, supporting a better reconstruction of the rainfall event.