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Impact of radar reflectivity data assimilation on heavy precipitation events forecast

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Concomitant with the development of Numerical Weather Prediction (NWP) system at convective scale in several meteorological centers, the data assimilation of mesoscale observations is expanding. Among the mesoscale observations, radar data appear to be a valuable candidate in precipitating situations to improve initial conditions of kilometric scale models as well as to be used for verifying their forecasts. So, within the development of the French high-resolution AROME model, we invest in the development of radar data assimilation. Arome is planned to run operationally in 2008, covering the French territory at a 2.5 km resolution. It benefits from complex physical parameterizations inherited from the mesoscale non-hydrostatic model Méso-NH (Lafore et al., 1998). The dynamical core and the assimilation system are derived from the Aladin ones. The data assimilation system is indeed based on the Aladin 3Dvar scheme. Arome should take advantage of information provided by the dense French radar network, including reflectivity and Doppler radial wind data. We focus here on the radar reflectivity assimilation component. An hybrid method 1D+3Dvar has been designed. The first step consists in a 1D inversion : humidity profiles are derived from reflectivity data thanks to the observation operator and a Bayesian method. During the second step, the humidity profiles are assimilated by the 3Dvar assimilation system. Radar data assimilation has been experimented on two Mediterranean heavy precipitation events. Impact of the radar data assimilation on the very short range forecast will be discussed, as well as results of sensitivity experiments to the frequency of assimilation cycle and to the configuration of the 1D inversion.