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Comparison between polarimetric radar cloud observations and Limited Area Model microphysical fields in a deep convection event

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The recent increasing use of polarimetric radars prompts for a better understanding of convective processes microphysics and may contribute to a better representation of cloud evolution and latent heat formation for assimilation purpose in NWP models.

The study is carried out using two polarimetric C-band radars located 90 km apart in the Po Valley of Northern Italy, the S. Pietro Capofiume and the Gattatico radars, both managed by ARPA Emilia-Romagna and Limited Area Model (Lokal Modell) microphysical outputs. The radar observations are collected during the transition of a severe evolving storm occurred on the afternoon of 20 may 2003, moving across the region explored by the two radars, and the microphysical properties are obtained by using an hydrometeor classification scheme developed at the National Severe Storms Laboratory (NSSL) and recently extended from S-band to C-band radar data. The Lokal Modell (LM) is the meteorological limited-area model used by ARPA-SIM both operationally and for research purposes and its microphysical scheme include 5 hydrometeors, for which the prognostic equations are solved: cloud ice, cloud water, rain, snow, graupel (specific contents in kg/kg).

The aim of the work is the comparison between the microphysics retrieved from radar data and the one simulated from LM inside the cloud during the all storm evolution. The comparison will be carried out analysing both vertical hydrometeor profiles and horizontal distribution of rainfall pattern evolution. As an example, analysing the vertical profiles, some differences between the vertical hydrometeors distribution observed from the radar instrument or simulated by LM are detected, especially in the case of

deep convection, that is particularly important being related to heavy rain and hailfall.

Therefore the radar estimated microphysics can play an active part in the validation and evaluation of the microphysic scheme of LM, with a future possibility to assimilate reliable latent heat or specific hydrometeors contents at all tropospheric levels, leading to a better reconstruction of the rain pattern.