

Comparisons between S, C, and X band polarimetric radar observations and convective-scale simulations of HyMeX first special observing period

Clotilde Augros

Radar Center and CNRM-GAME, Météo France, France

Caumont, Olivier (Météo France, France)

Tabary, Pierre (Météo France, France)

Gaussiat, Nicolas (Météo France, France)

Ducrocq, Véronique (Météo France, France)

E-mail: clotilde.augros@meteo.fr

The goal is to determine if and how the information obtained from polarimetric radars can be used in a convective-scale model to improve short-term weather forecasts. A radar simulator for polarimetric radar variables has been developed and added to the research mesoscale non-hydrostatic (Meso-NH) atmospheric model. The simulator enables direct comparisons of atmospheric simulations with observed polarimetric radar variables and can be used to evaluate the microphysical parameterization scheme of the NWP model. This development is also a first necessary step towards the assimilation of polarimetric radar data.

The polarimetric radar simulator, which is an upgraded version of the radar simulator developed by Caumont et al (2006), calculates electromagnetic wave propagation and scattering at S, C, and X bands. It takes as input, the model parameters produced by the simulation such as hydrometeor contents, temperature, and ice concentration. The following polarimetric variables are simulated: Zhh, Zdr, Kdp, Rohv, Ahh, Adp, Deltahv. The Particle Size Distributions used for the calculation of polarimetric variables, as well as the density-diameter laws (for graupel and snow), are consistent with the one-moment bulk microphysical parameterizations used in Meso-NH. For the parameters that are not provided by the microphysical scheme and that must be specified, like the shape, the orientation or the liquid water fraction of the melting species, a sensitivity study was conducted in order to select the parameters yielding the best consistency between simulations and observations.

Subjective and quantitative comparisons between observations and simulations will be presented for S, C, and X-band radars for different convective cases that were observed in fall 2012 in South-Eastern France during the HyMeX campaign (HYdrological cycle in the Mediterranean Experiment). From these comparisons, the aim is to draw conclusions as to which polarimetric variables could be used and in which conditions, for data assimilation in NWP models.