1.11 CHARACTERIZATION OF THE VERTICAL PROFILES OF DUAL-POLARIZATION RADAR OBSERVATIONS IN AND ABOVE THE BRIGHT BAND AT S, C AND X-BANDS

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In this study, the vertical evolution of dual-polarization radar variables in and above the bright band is examined for a number of cases at S, C and X-bands, using the Meteo France operational radars. The behaviours of the mean profiles of reflectivity at horizontal polarization Z_h, differential reflectivity Z_{dr}, copolar cross-correlation coefficient hv, and specific differential phase shift K_{dp} are interpreted by considering the microphysics of precipitation.

In particular, the profiles are analysed as a function of hydrometeor fall speed estimated using the Doppler radial velocity at 90° elevation angle (measured by the same or by neighbouring radars). The hydrometeor fall speed is a good indicator of the occurrence of riming: unrimed crystals or aggregates rarely fall faster than 1.5 m/s while rimed particles usually fall at speeds from 1.5 to 2.5 m/s (e.g. Vogel et al, 2017).

To complement the radar observations, Micro Rain Radar (MRR) observations of vertical velocity available from the IGE MRR deployed in Grenoble, close to the Moucherotte X-band radar, are used. In-situ aircraft observations (liquid water content, median drop diameter and temperature) close to the Plabennec C-band radar are also examined, to help infer the presence of supercooled liquid water.

For all the cases, the performance of the Meteo France Hydrometeor Classification Algorithm (HCA: Al Sakka et al, 2013) will be evaluated and improvements to this algorithm for stratiform precipitation cases will be considered, taking into account the vertical distribution of the radar variables.

References

Al-Sakka, H., A. Boumahmoud, B. Fradon, S.J. Frasier, and P. Tabary, 2013: A New Fuzzy Logic Hydrometeor Classification Scheme Applied to the French X-, C-, and S-Band Polarimetric Radars. J. Appl. Meteor. Climatol., 52, 2328-2344, https://doi.org/10.1175/JAMC-D-12-0236.1

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