

## **The dual-polarization processing chain V2**

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In recent years, several research studies have been carried out at Météo France to improve the quantitative precipitation estimation (QPE) products and develop new ones (Figueras et al. 2012, Kabeche et al. 2013, Al-Sakka et al. 2013). The findings have been used to upgrade the dual-polarisation processing chain to a new version (V2) that takes advantage of KDP for estimating rain rates and that incorporates a hydrometeor classification scheme. Instead of the standard Z-R relationship (Marshall-Palmer), the V2 uses both Z-R at low rain rates and R-KDP at higher rain rates. The classification algorithm is built on membership functions and takes into account measurement conditions and temperature information. Different formulations of the algorithm have been produced to work at X, C and S-band. These formulations use wavelength-adapted bivariate membership functions for (ZH, ZDR), (ZH, KDP) and (ZH,  $\rho_{HV}$ ) established using both T-matrix simulations and real data collected by the polarimetric radars of the French radar network.

An evaluation of the V2 has been obtained by directly comparing the new QPE product to the old one. Both QPE products are evaluated at the hourly time step against the Météo France rain gauge network and the comparison demonstrates that the new polarimetric processing chain produces better results at C-band and even grater at X-band. In particular, the results show that moderate to heavy rain rates are less likely to be underestimated when using the hybrid estimator of the new polarimetric processing chain. Benefits at S-band are less remarkable with similar scores obtained from the two processing, which suggest, that at this wavelength, the reflectivity-based estimator (Z-R) is more reliable as it doesn't suffer as much from precipitation-induced attenuation. Current plans are to start deploying the V2 to all polarimetric radars at the end of 2014.