Independent evaluation of the integrated Z/ZDR method for obtaining more accurate rainfall rates from polarization radar.

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Polarimetric radars promise to provide more accurate rainfall rates than provided by conventional radars measuring only reflectivity and are being introduced into operational C-band networks in Europe. For light and moderate rainfalls, the differential phase shifts are too small and so one must rely on the differential reflectivity, ZDR, which essentially provides a measure of the mean raindrop shape and hence its size. In principal when ZDR is combined with Z then the normalized raindrop concentration, Nw, can be derived if the drop spectrum is assumed to be an exponential or gamma function. In practice the observed values of ZDR are very noisy, so rather than use the data at each gate, we analyse the variation of Z and ZDR over a region of about 5km square, and hence derive the value of Nw over this region. The value of Nw over the region fixes the 'a' in the $Z=aR^b$. In this talk we will evaluate this technique, and compare the values of Nw obtained simultaneously by three independent methods: 1) the Z/ZDR technique described above, 2) From the Doppler spectrum obtained by a vertically pointing radar 3) From a disdrometer. Remarkable consistency is obtained, indicating that Nw can be derived from Z and ZDR to better than 3dB, so that the rainfall rate, R, should be accurate to within 1dB (25%). We will also present some results of the variability of Nw in different types of rainfall.