



Estimating light to moderate rainfall rates with polarisation radar.

R. Thompson, A. Illingworth

Dept of Meteorology, University of Reading, UK. (a.j.illingworth@reading.ac.uk / Fax +44-118-378-8905.)

Polarisation radar techniques have the potential to provide more accurate rainfall estimates, but observations of differential reflectivity (ZDR) and specific differential phase shift (KDP) at individual gates made with an operational radar will be very noisy. KDP can only provide rainfall estimates with good spatial resolution for high rainfall rates, but much significant rainfall occurs at lower rates, so we must use ZDR. For a 25% accuracy of rainfall rate we must measure ZDR with an accuracy of 0.1 or 0.2dB which seems difficult with an operational radar antenna. Instead we propose an alternative approach. Essentially, we are combining ZDR and Z to produce an estimate of the normalised drop concentration, N_w , which then fixes the value of 'a' in a $Z=aR^{1.5}$ relation. By analysing values of Z and ZDR over a region we show that it is possible to derive an accurate value of the mean N_w , and hence the mean value of 'a' which should be used to derive the rainfall rate from Z over that region. We also show how the statistics of Z and ZDR observations can be used to check the data quality.