

Radar Rainfall Estimation using a Quadratic Z-R equation

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The aim of this work is to test a method that enables the input of event based drop size distributions to alter a quadratic reflectivity (Z) to rainfall (R) equation that is limited by fixed upper and lower points. Results will be compared to the Marshall-Palmer Z-R relation outputs and validated by a network of gauges and a single polarisation weather radar located close to Essen, Germany. The time window over which the drop size distribution measurements will be collected is varied to note any effect on the generated quadratic Z-R relation.

The new quadratic algorithm shows some distinct improvement over the Marshall-Palmer relationship through multiple events. The inclusion of a minimum number of Z-R points helped to decrease the associated error by defaulting back to the Marshall-Palmer equation if the limit was not reached. More research will be done to discover why the quadratic performs poorly in some events as there appears to be little correlation between number of drops or mean rainfall amount and the associated error. In some cases it seems the spatial distribution of the disdrometers has a significant effect as a large percentage of the rain bands pass to the north of two of the three disdrometers, frequently in a slightly north-easterly direction. However during widespread precipitation events the new algorithm works very well with reductions compared to the Marshall-Palmer relation.