

Improving precipitation estimates from weather radar using rain gauges precipitation data quality control and correction techniques for Wernersbach sub-catchment in Germany

Firas Al Janabi and Christian Bernhofer

TU Dresden, Institute of Hydrology and Meteorology, Department of Hydroscience, Dresden, Germany
(firas.aljanabi@tu-dresden.de)

Rainfall data are usually collected at disconnected point locations on the ground at meteorological stations (rain gauges). Values at any other point must be interpolated or can be remotely sensed by ground-based radar, which can detect the areal distribution of precipitation at more detailed spatial scale. Nevertheless, radar measurements are affected by various types of errors and the transformation of measured radar reflectivity into rain rates is far from accurate. This study provides a deeper analysis of the differences between radar measured precipitation values and rain gauges values for the same rain events.

These include the identification and removal of errors resulting from variations in the vertical profile of reflectivity and radar sensitivity errors. Routine verification of the surface precipitation estimates has been undertaken, largely through comparison with rain gauge observations, over a range of timescales, which has allowed the benefits of the quality control and correction processes to be quantified.

By the means of linear regression analysis residuals between eight rain gauges and corresponding radar estimated rainfalls were calculated in the Wernersbach sub-catchment in Saxony and then studied using residual regression analysis with the distance from the radar antenna. A multivariate second order polynomial regression model was developed with three topographic and locational variables as the best predictors: altitude, distance, and latitude, which can explain some of the variances of the residual errors. This means that radar measurement errors are not only a cause of random variation but can be partially predicted, which may allow for some type of correction and improvement in radar's accuracy.

Keywords: Radar Precipitation, Rain Gauges, Wernersbach, Regression