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Disaggregation techniques for radar precipitation data and rain gauge precipitation data for the Wernersbach catchment in Germany.

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Rainfall data are traditionally collected at discrete 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 Wernesbach sub-catchment in Saxony, and then studied using residual regression analysis with the following independent variables: altitude, longitude, latitude, aspect, slope, curvature, distance from the radar antenna, aspect perpendicular to the radar beam referred to as directional difference, mean air temperature, and solar radiation. The independent variables were derived from the 90 m SRTM DEM in ArcGIS. 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 up to 74% of the variance 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.