

13.34 IMPROVEMENT OF THE ADJUSTMENT PROCEDURE ON A LONG- TERM RADAR DATA SET

M.JESSEN¹, T.EINFALT¹, I.FRERK¹

¹ hydro & meteo GmbH & Co.KG, Breite Str. 6-8, D-23552 Lübeck, Germany
m.jessen@hydrometeo.de

For the environmental state agency and several water authorities in North Rhine-Westphalia, Germany, a unique data set was created. It comprises continuous rain-fall time series based on rain gauge and weather radar data covering an area of approximately 40000 km² with a spatial resolution of 1 x 1 km and time period of 16 years with a temporal resolution 5 minutes. For the analysis, polar data of four weather radar locations and precipitation data of 1300 continuous and 300 daily measuring rain gauge stations were available.

Preparation of radar and rain gauge data

To get reliable precipitation information, a careful preparation of the uncorrected radar and rain gauge data is essential. The quality of each five-minute polar radar data set was enhanced by data quality control algorithms for ground clutter, beam blockage, attenuation and temporal interpolation. Based on these data sets a radar composite product with a resolution of 1 x 1 km was prepared. Rain gauge time series were checked with neighbouring stations and corresponding radar time series, and periods of suspect values were eliminated.

Adjustment procedure

In a first step the radar and rain gauge data were combined in an adjustment procedure based on a daily generated factor field. Adjustment factors were calculated at the rain gauge locations based on minimum daily precipitation sums and then interpolated by using the IDW (Inverse Distance Weighting) method and the factors of the nearest four stations.

Adjustment evaluation was based on a comparison of daily and yearly values and the statistical behaviour of rain gauge and adjusted radar data.

The adjustment generally produced good results when comparing rain gauge and radar data sums on a daily basis (calibration and validation stations). But in parts of the investigated area the yearly precipitation sums of adjusted radar data overestimate rain gauge sums by more than 5%.

The evaluation of the daily adjustment results using the statistical behaviour between rain gauge and adjusted radar time series with intervals less than 60 minutes showed an underestimation in the adjusted radar data for some time intervals and radar ranges.

Further quality improvement could be achieved by changing the parameter settings and a modification of the adjustment procedure. Depending on the data set characteristics (density of rain gauge network, spatial and temporal resolution of the radar data etc.) the following approaches and parameters show an important impact:

- Additional use of an adjustment field based on differences between rain gauge and radar data for low daily precipitation rates
 - Inclusion of a time shift between radar and rain gauge data
 - Selection of rain gauge-radar factors depending on direction, distance and precipitation amount for the IDW method
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- Distance-weighting parameter of the IDW method
- Z-R relationship

The results will be included in the radar event data base of North Rhine-Westphalia.
