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Impact of merging methods on radar based nowcasting of rainfall

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Radar data with high spatial and temporal resolution are commonly used to track and predict rainfall patterns that serve as input for hydrological applications. To mitigate the high errors associated with the radar, many merging methods employing ground measurements have been developed. However these methods have been investigated mainly for simulation purposes, while for nowcasting they are limited to the application of the mean field bias correction. Therefore this study aims to investigate the impact of different merging methods on the nowcasting of the rainfall volumes regarding urban floods.
Radar bias correction based on mean fields and quantile mapping are analyzed individually and also are implemented in conditional merging. Special attention is given to the impact of spatial and temporal filters on the predictive skill of all methods. The relevance of the radar merging techniques is demonstrated by comparing the performance of the forecasted rainfall field from the radar tracking algorithm HyRaTrac for both raw and merged radar data. For this purpose several extreme events are selected and the respective performance is evaluated by cross validation of the continuous criteria (bias and rmse) and categorical criteria (POD, FAR and GSS) for lead times up to 2 hours. The study area is located within the 128 km radius of Hannover radar in Lower Saxony, Germany and the data set constitutes of 80 recording stations in 5 min time steps for the period 2000-2012. The results reveal how the choice of merging method and the implementation of filters impacts the performance of the forecast algorithm.