



Radar-raingauge data combination techniques: a revision and analysis of their suitability for urban hydrology

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ABSTRACT

The applicability of the operational radar and raingauge networks for urban hydrology is insufficient. Radar rainfall estimates provide a good description of the spatiotemporal variability of rainfall; however, their accuracy is in general insufficient. It is therefore necessary to adjust radar measurements using raingauge data, which provide accurate point rainfall information. Several gauge-based radar rainfall adjustment techniques have been developed and mainly applied at coarser spatial and temporal scales; however, their suitability for small-scale urban hydrology is seldom explored. In this paper a review of gauge-based adjustment techniques is first provided. After that, two techniques, respectively based upon the ideas of mean bias reduction and error variance minimisation, were selected and tested in an urban catchment (865 ha) in North-East London. The radar rainfall estimates of four historical events (2010-2012) were adjusted and applied to the hydraulic model of the study area. The results show that both techniques can effectively reduce mean bias; however, only the technique based upon error variance minimisation can correctly reproduce the spatial and temporal variability of rainfall, which proved to have a significant impact on the associated hydraulic outputs. This suggests that error variance minimisation methods may be more appropriate for urban hydrological/hydraulic applications.

KEYWORDS

Gauge-based adjustment, merging/combination, pluvial flooding, radar, rainfall, urban hydrology.