

Rainfall-runoff modelling using merged rainfall from radar and raingauge measurements

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Precipitation is the most important driver of the hydrological cycle and therefore reliable rainfall measurements for the simulation of stream discharge and groundwater flow using hydrological models are crucial. Conventionally, rainfall from raingauge measurements is often used as input in hydrological modelling studies. However, in many cases the distribution of raingauges within the catchment is insufficient to capture the spatial variability of precipitation. Such a problem could be overcome in part by using spatially distributed rainfall with a high resolution in space and time from weather radars. However, weather radars are prone to many sources of errors and recent research has shown that by combining (merging) radar rainfall estimates with raingauge measurements it is possible to obtain better rainfall estimates that are also able to capture the spatial precipitation variability. Although there have been many studies on merging raingauge and radar rainfall, there is a lack of comprehensive comparisons on different merging techniques and their impact on hydrological modelling over a wide range of catchments. The aim of this study is to investigate the improvement in terms of runoff when using the radar-raingauge merged rainfall from different merging techniques, such as Kriging with radar-based correction (KRE) and Kriging with external drift (KED). Different sized catchments across Northern England are modelled with two or three rainfall-runoff models of different complexities. Moreover, hydrological applications of weather radar usually require rainfall data with short timescales (e.g. 5min or 15min), and therefore rainfall estimates obtained from different radar-gauge merging techniques at 15 minute timescales are incorporated into hydrological models so that direct comparison of streamflows can be explored.