Application of rainfall estimates using radar-raingauge merging techniques for hydrological simulations

Nergui Nanding, Miguel Angel Rico-Ramirez, and Dawei Han
Department of Civil Engineering, University of Bristol, United Kingdom (N. Nanding@bristol.ac.uk)

Rainfall estimates by weather radar have become an important alternative to raingauge measurements for hydrological modelling over poorly gauged catchments, due to its capability for providing spatially distributed rainfall with a high resolution in space and time. However, the potential of radar rainfall estimates has often been limited by a variety of source of errors. More recently, research has proven that by combining radar rainfall estimates with raingauge measurements it is possible to obtain better rainfall estimates that are also able to capture the spatial precipitation variability. However, the impact of using merged rainfall products as compared with conventional raingauge inputs, with respect to various hydrological model structures and catchment areas, remains unclear and yet to be addressed. In the study presented by this paper, we analysed the flow simulations of different sized catchments across Northern England using rainfall inputs from different radar-raingauge merging techniques, such as Kriging with radar-based correction (KRE) and Kriging with external drift (KED). Rainfall was estimated at an hourly timescale and therefore rainfall estimates obtained from different radar-gauge merging techniques at hourly resolution are incorporated into hydrological models so that direct comparison of streamflows can be explored. The main purpose of this paper is to examine whether these merged rainfall estimates are useful as input to rainfall-runoff models over rural catchment areas, focusing on the improvement of rainfall estimates by radar-raingauge merging techniques for runoff predictions rather than on the rainfall estimates themselves in relation to the catchments sizes and storm events.