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High resolution rainfall data for urban hydrology, flood modelling and prediction

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Hydrological analysis of urban catchments requires high resolution rainfall and catchment information because of the small size of these catchments, their fast runoff processes and related short response times. Over the last three decades, analysis of the performance of urban drainage systems has been done mainly through hydrodynamic model simulations. Rainfall input into these models has often been restricted to a single or a few rain gauge(s) in or near the catchment, rendering rainfall input into one of the main sources of uncertainty in model calculations. In recent years, rainfall data from weather radars that provide space-time estimates of rainfall is becoming increasingly available. Still, the scale of available radar rainfall information, with pixels of 1 to 2.5 km2, does no not meet the relevant scales of urban hydrology (e.g. Berne et al. 2004; Emmanuel et al., 2011). In addition, studies comparing rainfall data from radar and rain gauges show a deviation of 10 to even 50%, with larger differences for increasing temporal and spatial resolutions (e.g. Overeem and Holleman, 2010).

A new type of high resolution (X-band) weather radars promises to provide more accurate rainfall estimates at the spatial and temporal scales that are required for urban hydrological analysis (Willems et al., 2012). Recently, the RAINGAIN project was started to analyse the applicability of this new type of radars in the context of urban hydrological modelling. In this project, rainfall data from C-band and X-band radars and a network of rain gauges will be analysed in four highly urbanised catchments: Leuven (Belgium), two boroughs of London (UK), two catchments in Paris (France) and two polder catchments in Rotterdam (the Netherlands). High resolution rainfall data will be used as input into high resolution urban hydrological and hydrodynamic models to simulate and predict urban flood flooding using hybrid 1D-2D approaches (Simões et al., 2010).

Details of the radar equipments, characteristics of the four urban catchments and hydrological and hydrodynamic simulation models will be provided; results of the project stage and of a specialist workshop on radar rainfall estimation will be reported.

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