

Uncertainty estimation of urban areal rainfall by point measurements

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It is widely recognised that rainfall is highly variable in space and that the variability has a great influence on rainfall-driven processes, such as rainfall-runoff processes and evolution processes of runoff water quality in urban environments. It remains common practice to use point rainfall (measured by rain gauges) to represent areal rainfall in catchments. This study investigates the uncertainty of areal rainfall due to rainfall spatial variability when only point measurements are available. The variogram that characterizes the spatial rainfall variability is identified using data from a small-scale X-band radar installed in the Greater Lyon area in France. The areal rainfall uncertainty is quantified as a function of the variogram. The methodology is applied to quantify uncertainty of areal rainfall by point measurements in synthetic catchments using rainfall data from Greater Lyon. Results indicate that areal rainfall uncertainty with point measurement in the centre of a catchment is lower than that at one corner. Uncertainty of areal rainfall represented by one point measurement becomes more significant as the size of a catchment increases. Uncertainty of area rainfall can be reduced by increased number of point measurements.