



Assessment of precipitation using moving cars as rain gauges

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Optimal spatial assessment of short-time step precipitation for hydrological modelling is still an important research question considering the poor observation networks for high time resolution data. The idea here is to consider motorcars as moving rain gauges with windscreen wipers as sensors to detect precipitation. This idea is easily technically feasible if the cars are provided with GPS and a small memory chip for recording time and wiper frequency.

This study explores theoretically the benefits of such an approach. A simple traffic model is applied to generate car traffic on main roads in a river basin. Radar rainfall data are used as reference truth rainfall fields. Rainfall from these fields is sampled with a conventional rain gauge network and with a dynamic network consisting of moving motorcars. Those observed point rainfall data from the two networks are then used to calculate areal rainfall for different scales. Ordinary kriging and indicator kriging are applied for interpolation with the latter considering discrete rainfall ranges according to a likely number of windscreen wiper operation classes. The results are compared with the true values from radar observations.

The study is carried out for the 3200 km² Bode river basin located in the Harz Mountains in Northern Germany. Observed radar rainfall data from a heavy summer storm and station coordinates from the real network are used. The results allow a first assessment about how many cars need to be equipped with sensors for sufficient rainfall estimation on different scales and about the required sensitivity of the rain sensor.