



Urban High-Resolution Precipitation Product: Combining C-Band and Local X-Band Radar Data

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Modelling precipitation induced floods and their impact on flood-prone regions is one of the biggest challenges for hydrometeorological forecasters. The largest source of error in flood forecasting systems is uncertainty in precipitation estimation. In state of the art rainfall-runoff models, precipitation fields from C-band radars are used as input with temporal resolution in the order of 5 minutes and spatial resolution in the order of kilometres. These radars cannot observe the small scale structure of rain events that influences runoff especially in impermeable urban areas. Therefore, precipitation fields with higher spatial and temporal resolution would improve flood forecasting.

In recent years radar systems operating in the X-band frequency range have been developed to provide precipitation fields for areas of special interest in higher temporal (1 min or below) and higher spatial resolution (250 m or below) in complementation to nationwide radar networks. However single X-band radars are highly influenced by attenuation. Within the project Precipitation and Attenuation Estimates from a High-Resolution Weather Radar Network (PATTERN) the University of Hamburg and the Max-Planck-Institute for Meteorology operate a single X-band radar covering the city of Hamburg, Germany. The radar provides precipitation fields with temporal resolution of 30 s and range resolution of 60 m. The area is also covered by the C-band radar Fuhlsbüttel operated by the German Weather Service (DWD) that gives precipitation estimates with a temporal resolution of 5 min and a range resolution of 1 km.

We will introduce a method to merge the precipitation fields derived from the X-band radar into the precipitation field provided by the C-band radar Fuhlsbüttel. The observations of radar Fuhlsbüttel will also be integrated in the correction of the attenuated measurements of the X-band radar. The merged precipitation field of both radars will be a valid product to improve rainfall-runoff simulations in the city of Hamburg, because it combines the high-resolution of X-band radars with the more accurate rain-rate observations of C-band radars.