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and weather radars for accurate precipitation measurements over urban areas: Department of Civil Engineering, Aalborg, Unpublished

Abstract: Weather radars are perceived as valuable tools to enlighten the dynamic effects in the drainage system caused by the time and spacial distributed progressions in the rainfall event. An important prerequisite for using weather radar precipitation data in the field of urban drainage is, however, that the volume integration, which the radar conducts of the precipitation in the atmosphere, is representative of the actual precipitation hitting the ground surface and affecting the urban drainage system. If this transformation is incorrect or insufficient described it may cause significant errors in the radar based rainfall measurements, reducing the overall data quality and its applicability for e.g. urban drainage modelling or precipitation forecasts.

Different types of weather radars ranging from massive long-range S- and C-band radars to small cost-efficient X-band radars are in operation today. In Denmark it is quite common with dual coverage from both C- and X-band radars. The radars are operating with different configurations regarding: antenna design, wavelength, scanning strategy etc, which results in different properties for the measurement. Shorter wavelength results in a higher resolution and thereby a more detailed description of the precipitation and its propagation, while longer wavelengths are less sensitive to the atmospheric attenuation.

The basic concept behind the PhD project is its possibility to reduce the weaknesses and inaccuracies of one radar type by utilising the strength from another and vice versa. The overall aim for the PhD project is to investigate, how this combination is possible and furthermore, to develop the necessary intercalibration and data assimilation tools to produce a merged measurement. The expected outcome of the project is that it will facilitate methods for data fusion of different types of weather radar data in radar networks that produces a single combined precipitation image which outperforms the individual radars. This will increase the overall quality, value and the future applicability of weather radar based precipitation measurements in the field of urban drainage.

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