Improving Hydrometeorological Forecasting Using High-Resolution X-Band Radars (HyFoX)

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Europe has recently been affected by a number of heavy and long lasting rainfall events. Especially mountainous and urban regions are at high risk, because heavy rainfall induces devastating floods at steep slopes and in impermeable areas leading to serious damage. Forecasting these floods and their impact on flood-prone regions is still one of the biggest challenges for hydrometeorological forecasters.

The largest source of error in flood forecasting systems is uncertainty in precipitation estimation. Precipitation fields from C-band radars with temporal resolution in the order of 5 minutes and spatial resolution in the order of kilometres, as operated by national weather services, are used as input for state of the art rainfall-runoff models. Despite higher influence of attenuation by precipitation in the X-band frequency range, X-band radars and in particular networks of overlapping X-band radars have been proven to be a valid tool to provide precipitation fields for areas of special interest, e.g. urban or mountainous regions, in higher temporal (1 min or below) and higher spatial resolution (250 m or below) in complementation to nationwide radar networks.

Within the planned interdisciplinary project Improving Hydrometeorological Forecasting Using High-Resolution X-Band Radars (HyFoX), which is expected to start in autumn 2014, three different regions will be investigated: Rural flat area in the North of Hamburg, Germany; flat urban area of Hamburg, Germany, and mountainous urban area of the Besós River catchment including parts of Barcelona, Spain. The aim of HyFoX is to demonstrate the impact of high-resolution weather radar observations on rainfall-runoff modelling and (flash) flood forecasting in comparison to and in complementation of C-band radars in different environments. We will present the research plan of the project and all components (i.e. radar data and hydrological models) that will be used within HyFoX.