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Pluvial flooding support through rainfall indicators and tailored visualization

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Pluvial flooding, i.e. flooding caused by locally intense or extreme short-duration rainfall, is a phenomenon with an almost instantaneous transition from meteorological forcing to hydrological impacts. It is highly complex, e.g. because of its limited predictability and of its strong dependence on basin characteristics including man-made interventions, and it is of growing concern worldwide, particularly in an urban context. This is both because of the rapid urbanization, generally making cities more vulnerable to pluvial flooding, and the climate change, expected to generate even higher extreme intensities from now on. There is an urgent need to develop new methods and tools for e.g. integrating high-resolution rainfall data from different sources, for establishing connections between rainfall intensity and hydrological impact, and for presenting data and forecasts in a user-friendly and user-relevant way.

This presentation will focus firstly on the identification of suitable rainfall indicators (or thresholds) for assessment of urban flood risk, applicable both in a near-future context (early warning) and over a longer time horizon (climate change impacts). The following three approaches have been recently developed and evaluated in different research projects:

1. Insurance data. Information from insurance companies about claims following flood damage has been collected for some Swedish cities and related to high-resolution rainfall observations.

2. Citizen reports. In Rotterdam, citizen reports submitted during flood events have been analyzed and related to high-resolution rainfall observations.

3. Multi-event hydro-dynamic simulation. By forcing a hydro-dynamic model with a set of historical high-intensity rainfall events, thresholds indicating when the flood response changes may be identified.

Results from all three approaches overall support the possibility to identify suitable indicators for assessing (urban) flood risk on the basis of high-resolution rainfall data. In the second part of the presentation, a new rainfall visualization tool will be presented and demonstrated, that may be used together with the estimated flood risk indicators. The aim of the tool is to provide the user with optimal support both before the flood (for early warning), during the flood (for situation awareness) and after the flood (for post-event analysis).