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Relationships between rainfall data and water-related damage data for a case study in the Netherlands

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Intense rainfall may generate overland flows and pooling in urban areas, causing damage to buildings, infrastructure and inconvenience to people. Due to a lack of data on the consequences of flooding, assessment of damages related to pluvial flooding remains a challenge and so is the identification of explanatory factors for damage variations. Such methods should take into account the relative short time scales at which urban drainage processes respond to rainfall and local characteristics, such as the functioning of urban drainage systems, topography and building properties.

The objective of this study is to establish relationships between rainfall extremes and damage data from Dutch insurance industry for a case study in the Netherlands, Rotterdam. For this study, an insurance database containing a series of 20 years of information on water-related damages to properties and content in the Netherlands has recently been made available for research by the Dutch Association of Insurers. A data-driven statistical method is applied to analyse the damage database for the subset of the data related to the case study Rotterdam. Rotterdam is relatively flat and is therefore typical for cities in lowland areas. The subset of the database covers around 10000 of accepted damage claims recorded from 1998 until 2009 in Rotterdam. The rainfall data is based on a network of rain gauges (10-minute temporal resolution) and an 11-year weather radar database (2.4-km horizontal resolution and 5-minute temporal resolution) composed by the Royal Netherlands Meteorological Institute.

Data mining and statistical computing are carried out within *R*2.13.2 software environment. The derived rainfall characteristics, such as peak rainfall intensity, rainfall volume and duration are stored in a single dataset, as well as descriptive statistics of the damage claims. The dataset is aggregated by day and postal district. The strength of the relationships between rainfall characteristics and flood damage are determined by means of multiple regression analysis. During the presentation the results of the analysis will be discussed as well as implications for future research.