

Pluvial Flood Damage Analysis: A Case Study of Trelleborg, Sweden

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Background

Extreme rainfall events have been increasing in frequency and intensity. The scarcity of detailed pluvial flood damage data has hindered in-depth investigations into the reasons behind the flood damage. In this study, we examine historical pluvial flooding of properties in relation to rainfall to understand the flood events.

Table 1 – Pluvial flood damage events with the number of flooded properties

Flood event	Number of flooded properties	Sewer System	
		Combined	Separated
2006-8	195	52	143
2007-7	25	2	23
2010-8	196	23	173
2016-6	32	22	10
2019-6	35	24	11
2021-7	62	33	29

Methods

Intensity-Duration-Frequency (IDF) curves illustrate the likelihood of various extreme rainfall events. We utilized IDF curves for each flood event to analyse how the frequency of flooded properties is related to the intensity of rainfall. *IDF is derived from the reference period (2012 to 2024) rainfall data based on data availability using Generalized Extreme Value (GEV) distribution. Three stations at different location of the city were analysed: ARV (West), VV (Center) and ENG (East).*

Result

The preliminary investigation showed that the number of damaged properties had a link with rainfall characteristics.

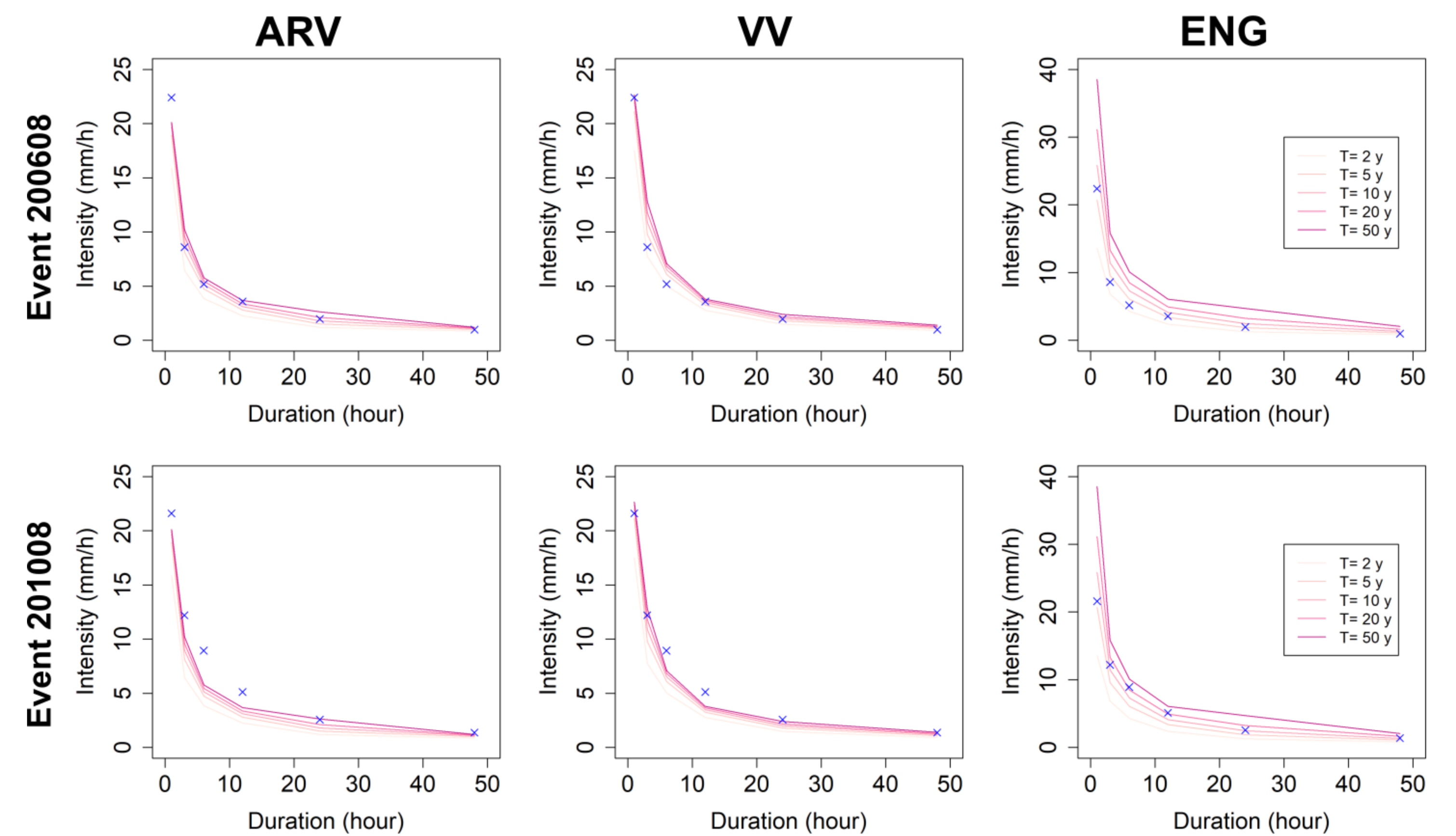


Figure 1 – 2006 and 2010 flood events. Intensity of rainfall event is marked with blue cross in relation to IDF curves.

The 2006 and 2010 flood events both had highly intensive rainfall of varying durations at different location of the city, especially at the short duration (1 hour), which posed challenge to the pipelines, and resulted in a highest number of flooded properties.

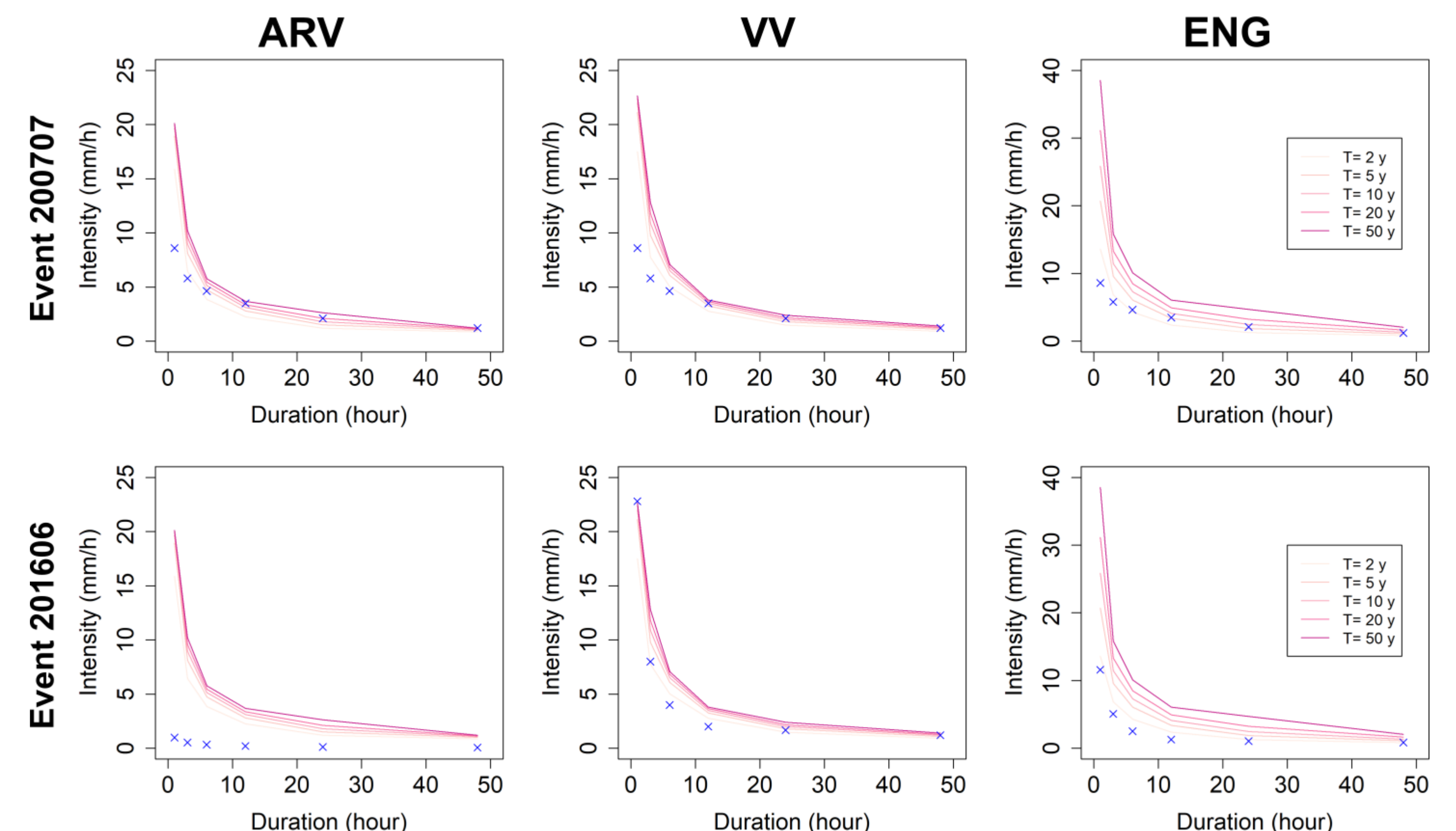


Figure 2 – 2007 and 2016 flood events. Intensity of rainfall event is marked with blue cross in relation to IDF curves.

The 2007 flood did not have a high return period for durations below 12 hours, while the 2016 flood was a small-scale event captured by only one station in the city center (VV). Consequently, neither resulted in a large number of flooded properties.

Future Work

The next steps of this study will include spatial analysis to model the occurrence of damages in relation to rainfall intensity, sewer type, and damage cost.