

## ***Interactive comment on “Towards identification of critical rainfall thresholds for urban pluvial flooding prediction based on crowdsourced flood observations” by Christian Bouwens et al.***

### **Anonymous Referee #3**

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#### \*\*\* General comments \*\*\*

The paper brings new ideas to the understanding pluvial flooding from an urban hydrology perspective. They use crowd sourced data in a good way, where no other data is readily available. The paper is well-structured and well-written with a fluent and precise language. The figures are in general very good – clear and easy to interpret. In general, I am positive to the paper. I hope that the following comments can help to improve it. Especially there are a few things that could be better discussed (see specific comments).

Most of the studies mentioned in the discussion section are written by the authors. It

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would be good if you could include references to others work as well and discuss the differences? Preferably studies about pluvial flooding from similar climatic zone, like the UK, Germany, Scandinavia, etc. There might also be relevant work from the U.S.

#### \*\*\* Specific comments \*\*\*

Abstract. Only rainfall mentioned. Imperviousness and distance to outflows are also investigated.

Sec1. Nice introduction.

Sec2.1. There are only 7 years of data. Did you capture any extreme events? What are the return level of the most extreme rainfall in the study?

Fig1/Sec2.2. Why do the study areas not follow the sewer districts? Probably obvious if you know the system...

Sec2.2. Three administrative districts are introduced, with a fourth district for comparison. These districts are not used in the analyses and neither mentioned in the discussion section (except for Kralingen once). I miss the comparison of the four districts. Why are the introduced and then not discussed?

Sec2.2. The key concept of Rotterdam is introduced. OP and CSO are discussed, however not these solutions. Why do you mention them? Do they have any implications for the results in your study? Discuss or delete.

Eq2. Not needed, enough to mention that it is a weighted average.

Sec3.2&3.3. In the introduction, you argue for the importance to analyse varying temporal and spatial resolution. How did you choose resolution? Why 15 min, 1 h, and 24 hours? Why not 4, 8, 12 hours for instance? Did you analyse the drainage system in some way? Describe the process. Similar question for spatial resolution.

Sec3.3. The assumptions for the flow path analysis are described and there are surprising results. I guess you made the analysis because you expected a relation. This

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result is barely discussed. Why where there no relation? Could the elevation be analysed better in a different way? What about distance to the main flow path or size of catchment area upstream instead of distance to downstream outlet? To me it seems strange to analyse the relation between a feature downstream of the flooded area, rather than the upstream area.

Fig7. Confusing with the name "urban watershed". Why are not all the urban area a part of an urban watershed?

Sec3.1. A single National Rainfall Radar pixel is used for each study area. Where are these pixels used? In 4.1 temporal correlation analysis? There is no discussion about how representative one pixel are for the area. Any tests made to ensure this? Discuss shortly.

Sec3.4. It took long time to understand how you did the analyses on change point. This section could be written better. It says "The appropriate dataset were ranked by event number". Don't you mean that it was ranked by e.g. rainfall volume and then given an event number?

Sec4.1. The removal of outliers needs to be better discussed. How do define an outlier? The theory behind seems vague.

Sec4.1. How can you get flood reports on days with no rainfall (Zeros)? Explain the registration. 20 reports during a day with no rainfall seems strange. Are you sure that the radar worked?

Sec4.2. You study imperviousness in the same cell. What about the effect of imperviousness upstream the inundated area? Discuss.

Sec4.2. Impatient callers... How are the registration done? Are all calls registered? What are the reason for someone to call? Do they get compensation for damaged properties? Describe the registration process and discuss the implications for your analyses.

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Fig6. Did you use fine or coarse grid for these analyses?

Sec5. Discuss limitations of the study. And as mentioned before, related it to others work from similar cities in the same climatic zone.

Sec5. Spekkers 2015: You write that you found similar results before. Mention the differences between the two studies. Why did you get 7-8 mm/h in that study and 12.5 mm/h in this study? Mention the differences in data and methods used.

\*\*\* Technical corrections \*\*\*

Fig1a. No need for all the details on the map, show a few city names instead. However, this is not crucial to change. Fig1b&c. Scale not indicated. Fig1c. Hard to read the names. Fig2a & Fig3a. Hard to differ the marks in black and white print. For colour blind, the figure must be difficult to read at all. Fig2b & Fig3b. Difficult to see the two outliers on the left hand side.

Spell out acronyms the first time (e.g. Dutch KNMI, German DWD and Belgium KMI).

Sec5. paragraph 3. ", as higher rainfall amounts are more likely to cause damage to buildings." Compared to what?

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