Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-197-RC1, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "The role of storm dynamics and scale in controlling urban flood response" *by* Marie-claire ten Veldhuis et al.

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Received and published: 5 July 2017

The paper presents interesting data-driven analyses of rainfall-runoff processes for flood events using a unique dataset of stream gauges in combination with radar rainfall data.

The paper is well written and easily understood and my comments below are primarily suggestions to further analyses rather than criticism of the conducted work.

1. Page 6 line 27 – page 7 line 9: Please provide information on the 15 min. radardata. Is this an average over 15 min or does it represent a "snaphot-value" in 15 min window? If it is an average over the 15 min I find it difficult to justify the resampling to 30 m resolution since the rainfall can have moved significantly during the 15 min. The must

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thus be a quite large uncertainty related to the time lag between rainfall and flow and the RWD. We did some studies on advection interpolation of “snapshot” radar data in order to increase the temporal resolution (Nielsen et al., 2014; Thorndahl et al., 2014) which gave much better rainfall estimates (doing mean field bias adjustment) than with the data with a lower temporal resolution. In this case we both resampled in time and space. Maybe this could also have been relevant here in order to reduce the aforementioned uncertainty.

2. I think it could be relevant to address the range of return periods of the analyzed events both in terms of rainfall over specific durations (and areas or fractional coverages) as well as return periods of the flood peaks.

3. The definition of flood is somewhat unclear. I guess that many of the events does not actually produce a flood (in the definition of inundation), but more high flows. Maybe it could be relevant to show an hydrograph example related to the definition in page 8 line 16-18.

4. One thing which also could be relevant to consider is the time between rainfall events or the time since the last rainfall event and how that affects the flood peaks. I could imagine that higher saturated soils (as a result of recent rainfall) would correlate well to the flow peaks

5. The use of the empirical 25 mm/h threshold to represent high intensity rainfall could be reasoned better. Would it make any difference if this threshold was lower or higher.

Specific comments

Page2 line 10. Here it could be relevant also to cite Thorndahl et al. (2017)

Equation 2. The use of T is somewhat misleading since it is used twice in the equation.

Figure 2. I could be relevant to provide the number of events in each basin in the figure.

References

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Nielsen, J.E., Thorndahl, S., Rasmussen, M.R., 2014. Improving weather radar precipitation estimates by combining two types of radars. Atmospheric Research 139, 36–45. doi:10.1016/j.atmosres.2013.12.013

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