

## ***Interactive comment on “Increase in urban flood risk resulting from climate change – The role of storm temporal patterns” by Suresh Hettiarachchi et al.***

### **Anonymous Referee #1**

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This manuscript addresses the impact of the changes in temporal pattern and volume of rainfall due to climate change on urban floods. In addition to the impact of total change in rainfall, the impact of the projected changes in temporal patterns alone is estimated. The background scientific question is important and the results are interesting. However, there are several issues that should be addressed before it is published.

<Major comments> - My major concern is the applicability of the scaling methods (both for volume and temporal pattern) for estimating the "projected" changes in the rainfall. The scaling factors are based on the relationship between the rainfall and temperature in the present climate. However, the present manuscript uses the scaling factor to

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estimate the "projected" changes in the rainfall induced by the climate change. Both the temporal pattern and rainfall volume will be affected by the changes in various dynamic and thermodynamic factors, not only by the changes in temperature. The applicability of the scaling method, which is based on the present climate variability, to the estimation of changes in rainfall under climate change should be verified. At least, it should be discussed in the manuscript.

L231-232: The characteristics of the temporal pattern selected from NOAA ATLAS is important in this study. It should be explained more in the manuscript or figures about what the six temporal patterns are like.

<Minor comments> L224-226: How the spatial distribution of rainfall in the catchment considered? Is it uniform over the catchment? Please describe it in the manuscript.

Table 2 (Design Rainfall): Why don't you use the same unit (e.g., mm/24hour) for all three rainfalls?

Table 2 (descriptions of temporal patterns): I don't understand what the "1st quantile 10th percentile" is. Explaining more about the temporal pattern will help reader's better understanding. To show the shape of the pattern in the figure may be helpful.

L264-270: Using some equations for the explanation on the volume scaling may be helpful for readers.

L399 "... as shown in Figure 5(a)": Should be Figure 6(a)?

L443-445 "...the mean of the flood depth for projected events does exceed the upper limit of the variability in flood depths for the base scenario": I don't know which part of the figure shows the upper limit of the variability for the base scenario.

L477-478 "The increase .. due to changes to temporal patterns alone range from 1% to 35%": Does these percentage numbers come from Figure 7? Since the unit of the Figure 7 is meter, it is difficult to figure out the percentage change from Figure 7.

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