

## ***Interactive comment on “Influence of rain pulse characteristics over intrastorm throughfall hot moments” by J. T. Van Stan and T. E. Gay***

### **Anonymous Referee #2**

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The study by Van Stan and Gay investigates which meteorological conditions are responsible for concentrations of throughfall volumes. The authors choose the following approach for their analysis: 1) they cluster rainfall pulses using a set of five variables (rain amount, coefficient of variation (CV) of rainfall intensity, wind run, vapor pressure deficit (VDP), and antecedent dry period (ADP)), 2) after identifying four distinct groups of rainfall pulses, the authors relate throughfall amounts to the corresponding rainfall pulses in the four clusters and analyse which meteorological conditions are responsible for relative throughfall values  $> 80\%$  (these values are categorized as “throughfall hot moments”). Although I think that the presented work is interesting and relevant for the readers of HESS I believe that several points need to be addressed before the work can be considered for publication. In the following I discuss three general issues and

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provide a list of some minor comments.

## General comments

1) Terminology and classification of “hot moments”. I am not sure if the term “hot moment” is really appropriate for describing temporal concentrations of throughfall. Even so the concept of “hot” and “cold moments” might be established it is rather confusing in the context of this paper. Why not working with terms that really describe what the authors try to investigate (such as “concentration in relative throughfall”)? Moreover, the decision to classify relative throughfall  $> 80\%$  as a “hot moment” is (as the authors admit, P11343 L. 4 – 8) arbitrary and it is not clear how this decision influenced the results.

2) Data. There are two problems with the data used in this paper. First, the distance between the rainfall and the throughfall measuring site is large (distance of 1 km, P. 11341, L. 5 – 6). As a result, throughfall data do not necessarily reflect rainfall volumes. This issue is critical because the analysis is based on relative throughfall data (relative throughfall = throughfall / rainfall). Second, it is not clear why the authors restrict their analysis to 56 rain events only. Given that the work is based on tipping bucket data it should be possible to use more data. A larger dataset may outweigh potential errors caused by the large distance of the rain and throughfall monitoring sites.

3) Statistics. Throughout the paper the authors use both parametric and robust statistics for the same variable. This inconsistency should be avoided. For instance, it does not seem sensible to me to compare the coefficient of variation (CV) with the median of the same variable (e.g. P. 11346, L. 8 – 9). The CV is a parametric measure of variation ( $CV = \text{standard deviation} / \text{mean}$ ), whereas the median is a robust measure of central tendency. To ensure consistency, the authors should either use parametric (CV, mean etc.) or robust statistics (interquartile range, median etc.) but not a mix of both approaches. In other parts of the manuscript, the authors provide the median of a variable and its standard error (P. 11346, L. 16; P. 11362, Table 1; P. 11363, Table

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2). This is not inconsistent, this is clearly wrong. The median of a variable and the standard error of this variable cannot be reported together. The standard error is a quality measure of the mean (it equals the square root of the sampling variance). Consequently, it makes only sense to report the mean and its standard error. If the authors wish to use robust statistics they may provide the median and the median absolute deviation (MAD).

## Line-indexed comments

P. 11337, L. 10: The range of relative throughfall is larger than 70 – 90 %; values between 60 % (e.g. Krämer and Hölscher, 2009) and 95 % (e.g. Zimmermann et al., 2013) are not unusual.

P. 11343, L. 6: At individual locations throughfall can be » 100 %. For clarity, please make sure that you refer to average throughfall.

P. 11343, L. 14: Please provide a more in-depth explanation for “clusters fell prey to chaining”.

P. 11364, Figure 1: For clarity, please use a symbol for the monitoring site that has no background.

P. 11368, description of Figure 5: There is no reference to sub-figure “c)”. Please correct.

## References

Krämer, I., and Hölscher, D.: Rainfall partitioning along a tree diversity gradient in a deciduous old-growth forest in Central Germany, *Ecohydrol.*, 2, 102–114, 2009.

Zimmermann, B., Zimmermann, A., Scheckenbach, H.L., Schmid, T., Hall, J.S., van Breugel, M.: Changes in rainfall interception along a secondary forest succession gradient in lowland Panama, *Hydrol. Earth Syst. Sci.*, 17, 4659–4670, 2013.

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