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Review of "Characterization of Hillslope Hydrologic Events Through a Self-Organizing Map" by Lee and Kim

Anonymous Referee #2

Referee comment on "Characterization of soil moisture response patterns and hillslope hydrological processes through a self-organizing map" by Eunhyung Lee and Sanghyun Kim, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-107-RC2, 2021

Review of "Characterization of Hillslope Hydrologic Events Through a Self-Organizing Map" by Lee and Kim

I found the manuscript very interesting, however, I would say the manuscript needs significant improvement to get to the publication level and some major changes or clarification should be done. My major comments:

- The manuscript is written with a simple language however it is still very difficult to easily follow the manuscript. I think, although, the use of the English language in formulating the sentences is sufficient however the logical flow of the text is not intuitive and hampers by evolving around the technicalities and repetition.
- I think figures can be improved and can be better explained in the text. For example, it is very hard for me to comprehend Figure 2 (and other figures which perhaps has a lot of dense information).
- Can the authors perhaps provide a more physical understanding of the clusters?
- I think the questions which the authors are asking were not directly answered. Perhaps the questions can be better elaborated in the discussions and reflect on the conclusions.
- The key points are very vague please make them more specific to this study and the finding of this study. Title can also be improved; title is very generic and broad.
- Perhaps reduce the long explanation on the method and wordy results to sharpen the messages.

- I would like to encourage the authors to bring their study into wider hydrological modeling efforts. What is the message of the results for the hillslope hydrology at a larger scale? The hydrological models carry memory (antecedent soil moisture) for example, so the strong correlation the author is showing here is implicitly taken care of in the models that using time-stepping of storage over time. I do not see an important message from this study which is different from the general knowledge that we already have on how hillslope might behave; the findings may not be that different from what it can be inferred from a model. as an example, how Figure 4 would look like if the authors have repeated their study on a hydrological model at hillslope scale rather than the data itself. I would say we would strongly find the same pattern, so what is new? The authors can cite modeling work at catchment scale and try to contextualize their work. The previous studies such as Fang, Clark, et al., 2019 WRR, Loritz et al., 2017 HESS, Gharari et al., 2014 HESS, Gharari et al., 2011 HESS, Gao et al., 2014 HESS among others.

I believe the manuscript needs to be significantly improved on multiple fronts. Readability and consistency of the flow of the manuscript, clarity of the messages that can be used in a broader context which can provide us with better ability to understand the system and hence improve the models at hillslope. I believe major revision is inevitable.

With kind regards,