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Comment on hess-2021-97

Anonymous Referee #2

Referee comment on "Hydrometeorological drivers of flood characteristics in the Brahmaputra river basin in Bangladesh" by Sazzad Hossain et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-97-RC2, 2021

Although this study would be worthy of publication in HESS, I think its current version does not meet the overall quality of HESS journal. The paper is not well written, and the structure ("key story") is not provided in a logical sequence. The idea that hydrogeological drivers (e.g., monsoon rainfall and antecedent soil moisture) determines the characteristics of floods Brahmaputra and Ganges rivers is not novel. I believe that the authors have done a lot of work analyzing the data, but authors failed to convince the readers why they are doing so. The style of this manuscript is more like "this is what we did". As a reader, I am not convinced by the authors that their findings are novel and interesting. Here I provide three general (personal) suggestions for authors' review which may help improve the overall quality of this manuscript:

- State the key objective or research question clearly and revise the introduction accordingly. The current version of this manuscript covers, at least, two main topics: attribution of flood characteristics into hydrometeorological drivers and comprehensive analysis of three historical flood events in Brahmaputra basin. However, none of them is well defined and presented in a logical structure. If the first case is the objective, authors should increase their sample size (i.e., over 30 years flood data) to make a robust conclusion. If the second case is the goal, authors should focus contrasting three flood events (i.e., types) and highlighting the key features that cause the difference. A good example of analyzing single flood event can be found: Smith, James A., et al. "Extreme flood response: The June 2008 flooding in Iowa." Journal of Hydrometeorology 14.6 (2013): 1810-1825.
- Based on the determined research objective, authors should consider remove some unnecessary analyses which fail to directly support the main conclusion. The current study used GEV distribution, trend analysis, correlation between climate indices with floods, wavelet transform etc. However, some of the analysis does not directly support the conclusion. For example, authors show there is a trend in water level but failed to attribute this trend to any of the hydrometeorological drivers and to explain how this trend affects the flood characteristics in general. If authors want to include a conclusion or result, defend it in detail. Otherwise, drop it.
- Go through the paper and make every sentence convincing and logical. Also, delete the

sentences conveying the same idea. As a reader, some sentence sound vague and does not provide the information I am expected to understand. Here are two examples:

- Line 556: "*However, due to spatial variation of rainfall there can also be cases of a more rapid rise in water levels.*" I am expected to understand the reason why rainfall heterogeneity causes the rapid rise in water levels at the gage. Is it because rainfall hit the region where the watershed slope is high? Are these rainfall have similar temporal distribution?
- Line 534: *"The estimated annual maximum discharge in 2019 and 2017 was lower than the one in 1998, despite higher water levels."* In most gages, the discharge is estimated using rating curve and water level. So I am expected to understand why high water level is linked to a low discharge, which authors failed to provide.