Author's reply on hess-2021-278

Anonymous Referee #2

Referee comment on "Maximum Entropy Distribution of Rainfall Intensity and Duration – MEDRID: a method for precipitation temporal downscaling for sediment delivery assessment" by Pedro Henrique Lima Alencar et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-278-RC2, 2021

Dear Anonymous Referee #2, we thank you very much for your comments on our work; we fully accept them.

Referee. *This manuscript by Alencar et al. addresses a very important topic to estimate the sediment yield in data scarce region. Although research topic and Introduction motivated me to look forward to further sections on Methodology and Results in the manuscript, I must say that it was very confusing from Section 2 onwards to follow because Authors kept referring to previous work by one of the co-authors de Araujo 2007 and 2017. I looked into supplementary material which was not really helpful. I suggest Authors to present the methodology clearly and as far as possible, independent from previous work. Otherwise, novelty of the approach becomes questionable.*

Author's response. The Methodology and results are being reshaped to increase clarity. The works from de Araújo (2007 and 2017) are referenced because our submitted paper is an advancement upon the two previous works. The first (de Araújo, 2007) presents the SYPoME formulation that allows sediment yield assessment. The second (de Araújo, 2017) presents an initial attempt to use daily data to downscale daily precipitation in ungauged catchments (same goal as our more recent work, however they did not use entropy).

Referee. *As a hydrologist, I was hoping to see the results of temporal downscaling in terms of a time series showing daily and subdaily information at the selected sites. There are many literature on the topic of downscaling daily to subdaily data, especially rainfall, but Authors actually went quickly into MEDRID-SYPoME description, overlooking the fact that the downscaled results need to be evaluated carefully as it is one of the major inputs for producing sediment yield.*

Author's response. Our focus with the MEDRID is to obtain duration and 30-minute intensity, necessary as input to the SYPoME model. As pointed out by Anonymous Referee #1, presenting the MEDRID in such centrality was a poor choice that is being corrected.

Referee. *I wonder the approch presented in this manuscript is area specific. The claim that the presented method is more accurate than the conventional method can't be justfied unless the approach is applied to different topographical and climatic regions. To set up a hydrological model to derive sediment yield at the outlet, one has to calibrate so many parameters using the observation data, I am not clear how all those complicated steps can be bypassed by using a set of equations.*

Author's response. The SYPoME model has been implemented both in multiple catchments Brazil and Switzerland with success and requires the calibration of parameters, which are not area specific. The downscaling method presented requires the definition (calibration) of the suited probability distribution function (a generalized gamma distribution). Finally, to validate the model we used measures of siltation that are hard and costly to obtain, particularly with the level of quality presented in this study, therefore only a limited number of study areas as available.

Referee. *The main results for sediment yield is presented in Figure 5. it would be better if the results are presented in terms of time series, not just one red dot showing total yearly sediment yield. Also 5% and 95% confidence limit on the modeled result can be shown in a time series plot.*

Author's response. This illustration can be prepared, however measured data are not available as time series, as presented in Table 2.

Referee. *Overall, Authors should very carefully highlight what is there in this work which is different from their previously published work. Present the methodology clearly so that readers don't need to refer to several other papers to understand it. Also, the results section should be made clearer with more plots.*

Author's response. Once again, we thank the Referee for their thoughtful comments, which will be taken into consideration and accepted. We are already working on the necessary improvements.