Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
https://doi.org/10.5194/hess-2021-278-RC1, 2021

Author's reply on hess-2021-278

Anonymous Referee #1

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-RC1, 2021

Referee. *The authors have reviewed the manuscript intitled "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. In this manuscript, the authors presents a method (MEDRID) for precipitation temporal downscaling, then coupled with the SYPoME model to indirectly assess the MEDRID performance. Even though the results presented in the several catchments indicated that the MEDRID method have a good performance, but the authors should make it clear what the novelty of this study is. In addition, the description of how to couple with the SYPoME model is not clear, which makes a direct application difficult of this method. I would then suggest rejection of the article with invitation to resubmit. My major comments are described below.*

Authors' response. Dear Anonymous Referee #1, thank you very much for your comments, which we fully accept and comment in the following lines.

Referee. *(1) The novelty of the MEDRID method is not clear in this version. The Maximum Entropy Principle (MEP) has been widely used in many fields for the selection of an optimal distribution function. The authors seems just use the MEP to select an optimal distribution function for rainfall intensity and duration, if so, the article obviously lacks innovation. Thus, the authors should classify the novelty of the MEDRID method.*

Authors' response. We agree with the Referee that the mere selection of the optimal probability distribution function using the PME does not suffice for a paper to be accepted. However, the novelty of the manuscript goes beyond it. It lays in a robust method (based on many years of field data and on a physical and statistical / MEP approach) to adequately downscale daily rainfall data into sub-daily information that is useful to assess erosive processes. Thus, the use of the optimal distribution to assess sediment yield in data-poor areas is of relevance. Despite the novelty of the proposal and its good results, the authors agree that we failed making it clear in the manuscript. We also agree that MEDRID should be posed as a tool, not as the central message of the paper.

Referee. *(2) The description of how to calculate the series of the ratio D/H and I30/H is confused. Is D/H and I30/H relative to a rainfall event (may last for several days) or just relative to a daily rainfall (only one day)? Should all non-zero rainfall days be considered?*

Authors' response. We thank the Reviewer to address this issue and it will certainly be further explored in the revised text. The main rainfall formation process in the region is convective (and, less important, orographic), which causes intense precipitation events with limited duration. In fact, after 19 years of monitoring, we observe that less than 0.5% of the events last more than 24 h; and the longest event lasted 26 h. Because of this feature, and for simplicity's sake, we assume that events longer than 24 h are considered to occur on a single day.

Referee. *(3) The application of the D/H distribution, coupled with the SYPoME model, were described in Sect. 2.3. But I did not see relative description of how to use the I_{30}/H distribution for SYPoME model. The reliability should be improved.*

Authors' response. The authors agree with the Referee that this subject must be better explained in the revised text. The ratio (I_{30}/H) is used to assess the rainfall erodibility. This issue had been addressed in the supplements, but it can be brought to the main text, so as to implement the necessary clarification.

Referee. *(4) The authors indirectly assess the performance of the MEDRID method by comparing the M1 and M2 model. However, it can be found from the Figure 5 that the M2 error is systematically large, why? Does this affect the reliability of the comparison result?*

Authors' response. We thank the Referee for the comment; however, we believe that there is a misunderstanding at this point. In Figure 5 the red dots indicate the measured data. The model M2 output is indicated as a boxplot because the model is non-deterministic, and its output is a set of possible answers. In Figure 5a, we observe that in all (seven) catchments, the measured data is actually closer to the M2 output set than to the grey dots, which indicate the deterministic approach.

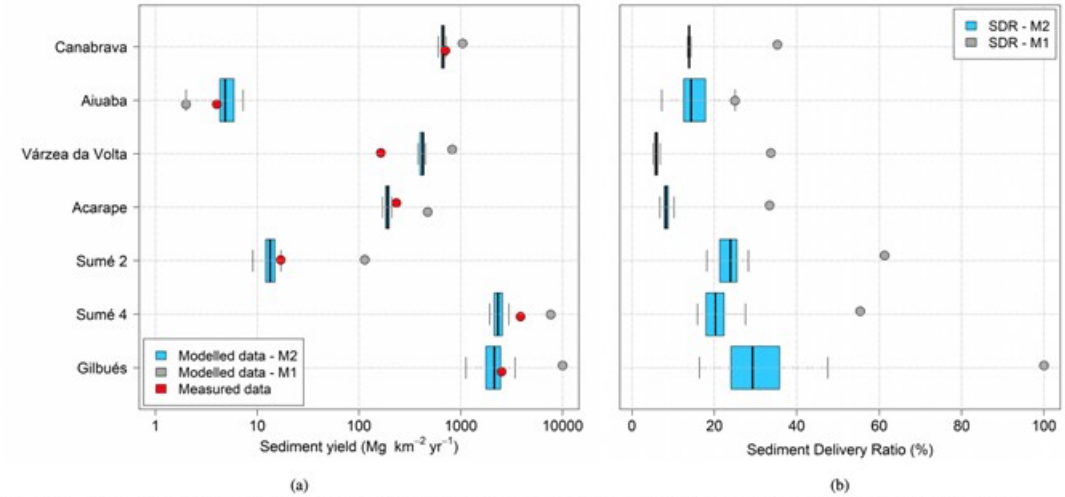

Figure 5. M1 and M2 outputs of (a) sediment yield and (b) SDR. Red dots in (a) indicate the measured values of sediment yield.