Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2019-216-RC3, 2019

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Temporal rainfall disaggregation using a micro-canonical cascade model: Possibilities to improve the autocorrelation" *by* Hannes Müller-Thomy

Anonymous Referee #3

Received and published: 22 June 2019

The paper deals with the improvement of a given disaggregation model using micro-canonical cascade. In general the topic is relevant for the community. The paper is interesting, but cannot be published in its current state, and requires major modifications.

General comments: - The paper is quite hard to read with many models being compared. Explanations for the slight variations between the various models are sometimes hard to follow. There is a lack of mathematical details in the presentations of the various models. - Only comparison between variations of a given model are provided. Comparisons with other type of cascade models should at least be discussed. - There

Printer-friendly version

Discussion paper

are numerous parameters to be estimated per model (not even very clear which number according to the model choice). It is not clear whether a calibration period and a validation period were used.

Detailed comments:

1) Introduction - p.2 l.21 : “since time series with 1280 minutes do not exist as observation do not exist”. I do not understand this statement and this does not seem a real issue. Anyway, if needed, you can disaggregate at a higher resolution and up-scale to the desired one.

2) Rainfall data - p. 3 l.28-29 : “from a practical. . . have an impact on the autocorrelation function”. Why not trying the compute the autocorrelation using higher moments to limit the influence of smaller values ? - p.4 l.10 : “how can a minimum rainfall intensity be ensured during the disaggregation process?”. It is not very clear to me the need for this, since as pointed out by the author and references cited, it might very well be simply due to the rain gauge measurement limitations. It might be worth testing a time series obtained with a disdrometer which enables better representation of small values of rainfall.

3) Methods - p.5 l.8 : “actual” - - > “Actually” - Eq. 1 : it should be added how lambda is related to t1 and t2 (I guess lambda = t2-t1) - p. 6 l.24 : “on” - - > “no” ? - Eq. 2 : shouldn’t it be P(0/0/1)/3 in the first line since there are three possibilities (100,010,001) for the same P(0/0/1) ? This remark is also valid for all the other probabilities except P(1/3,1/3,1/3) - p.7 l.11 : “an empirical function”, please be more specific (see also general comment on the lack of mathematical details). - p.7 l.15-18 : a summary table or scheme would be helpful. - It remains weird to have different branching number and probabilities weights for the first cascade steps which seems to be in contradiction with the underlying scaling properties. - Section 3.1.3 : I found the paragraph quite hard to read. may be a more precise scheme could be helpful. It should be mentioned that it adds a lot of parameters. In general, a summary table with the number of parameters

according to the model would be helpful. - Section 3.2 : why presenting two different models (especially given that they provide rather similar results) ? It adds complexity to a paper with already a lot of comparison. I would keep only the MMD which is the more realist I believe. - Section 3.3 : The process with Ir and more generally the swapping seems rather ad hoc. It seems that the underlying physical meaning of cascade process is lost. I think that this issue should at least be discussed. - p. 13 l. 18 : “30 realisations”. Why such a small number, it seems that much more could have been performed.

4) Results - Table 3 and 4 are really hard to follow. I think a scheme representing the various cases could be really helpful. - Why the average rainfall intensity changes is such a micro-canonical cascade ? - p. 19 l. 5-10 : may be a graph showing the sensitivity of the results to Ir would be be needed.

5) Discussion - p. 21 l. 14-15 : “identified similarities. . . used for simplification”, please clarify and be more explicit.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2019-216, 2019.

Printer-friendly version

Discussion paper