Earth Surf. Dynam. Discuss.,
https://doi.org/10.5194/esurf-2018-94-SC1, 2019

Earth Surface Dynamics Discussions

Interactive comment on "Rainfall intensity bursts and the erosion of soils: an analysis highlighting the need for high temporal resolution rainfall data for research under current and future climates" *by* David L. Dunkerley

Müller- Thomy

mueller-thomy@hydro.tuwien.ac.at

Received and published: 30 January 2019

General: The paper deals with rainfall bursts and focusses on a literature review, pointing out the need for further rainfall studies on finer temporal resolutions (<1 hour) and an enhanced understanding of the physical processes causing erosion. Therefore, the author provides data examples from two study sites highlighting the rainfall bursts, which can only be detected on a fine temporal resolution of <1 hour. I read the paper because i) I was interested in the findings and ii) cascade models are mentioned as disaggregation methods in the manuscript. Hence, my comments cover only parts of

the manuscript dealing with these two topics.

P4l8-9 The author applies a threshold intensity of 30 mm/h for the identification of "intensity bursts" and refer to Tokay and Short (1996). However, the threshold suggested by Tokay and Short is 20 mm/h. For me it is not clear, if this is only a spelling error or the wrong reference. If it is none of both, how was the threshold of 30 mm/h determined? Is this threshold as an absolute value representative for different study sites or does it make sense to express the threshold as a quantile to determine different thresholds for different regions? What is the authors opinion?

P 21l12-13 The author mentions cascade models for rainfall disaggregation and applies the term "canonical cascade model". Only a few paper consider this term as a group name for the family of cascade models. It is more common to distinguish between micro-canonical (rainfall amount is preserved exactly in each disaggregation step) and canonical cascade models (rainfall amount is preserved on average in each disaggregation step), see Schertezer and Lovejoy (1987). Indeed, all the cited references (Paschalis et al. (2014), Kianfar et al. (2016), Pohle et al. (2018)) belong to the group of micro-canonical cascade models. To avoid confusion and misinterpretation I suggest i) to change the term to "micro-canonical cascade models" or ii) to extend the sentence to micro-canonical and canonical cascade models and to provide examples as well for the canonical cascade models.

P21l12-13 In the given reference Haddad & Rahman (2014) no cascade model is applied for downscaling. In the context of erosion processes, I suggest to implement the study of Jebari et al. (2012) instead.

P21 section 2 I would extend the disaggregation part by at least mentioning other disaggregation techniques (e.g. method of fragments, Bartlett-Lewis rectangular pulse models) to increase the awareness of the reader for the existence of different available methods.

P21l13 "with only moderate success in generating realistic intensities". For me, the

term “unrealistic intensities” remains unclear. Since the focus of the study is on rainfall extreme values, I suppose the sentence is about the rainfall extremes identified in the disaggregated time series. However, I would avoid such a general and negative statement There are a couple of investigations where the micro-canonical cascade model is applied for disaggregation processes resulting in a good representation of rainfall extreme values (e.g. in Müller and Haberlandt (2018) for 5-min time steps).

References (additionally to the references already listed in the manuscript):

Jebari, S., Berndtsson, R., Olsson, J. und Bahri, A. (2012). Soil erosion estimation based on rainfall disaggregation. Journal of Hydrology 436-437, 102–110.

Müller, H. und Haberlandt, U. (2018). Temporal rainfall disaggregation using a multiplicative cascade model for spatial application in urban hydrology. Journal of Hydrology 556, 847-864.

Schertzer, D., and S. Lovejoy (1987). Physical modeling and analysis of rain and clouds by anisotropic scaling multiplicative processes. J. Geophys. Res., 92, 9693– 9714.

Interactive comment on Earth Surf. Dynam. Discuss., https://doi.org/10.5194/esurf-2018-94, 2019.