

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-99

Anonymous Referee #1

Referee comment on "Advanced sensitivity analysis of the impact of the temporal distribution and intensity of rainfall on hydrograph parameters in urban catchments" by Francesco Fatone et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-99-RC1>, 2021

Manuscript: HESS-2021-99

General notes:

The manuscript: "Advanced sensitivity analysis of the impact of the temporal distribution and intensity in a rainfall event on hydrograph parameters in urban catchments: a case study" proposed by Fatone et al., introduces a sensitivity coefficient to study the impact of the variability of hydrodynamic model parameters depending on rainfall distribution and intensity. Results, determined for a SWMM model of an urban catchment in Kielce (Poland), show the influence of rainfall distribution and intensity on the sensitivity factors

Although the paper is quite interesting and it has the potential to be published in HESS, it needs some minor adjustments. In particular, the novelty and innovative aspects of the work could be better highlighted in the abstract and introduction. Moreover, only the temporal rainfall variability is evaluated, without considering the strong connection with the spatial rainfall distribution, especially in a small urban environment (see Schilling, 1991, Berne et al., 2004; Ochoa-Rodriguez et al., 2015, Cristiano et al. 2017). This aspect should be at least discussed in the conclusions.

The methodology needs to be restructured. Elements like SWMM and the GLUE are described only at the end of the methodology section, while they should be moved to the introduction or in an additional section "Theoretical background" before the study case description. The sections Methodology and Results would benefit from a short intro describing the structure of the section, to guide the reader.

The manuscript is overall clear; however, it would benefit from a native speaker revision to improve the English quality.

Title:

I'd suggest rephrasing and shortening it. Otherwise, at consider adding "...the temporal distribution and intensity OF PRECIPITATION in a...." and removing ": a case study".

Abstract:

The aim and the novelty of the work could be better highlighted in the abstract. Please avoid unnecessary abbreviations in the abstract.

Specific notes [page, line]:

[2,3] "there is the need to model the runoff generation"

[2, 52] "As shown in the literature (...), the analysis..."

[Introduction] consider to add a short paragraph that describes the structure of the paper with the aim to better guide the reader.

[5, Methodology]: please check the section numbers

[5,137]: Please add a reference and motivation for this choice. Why 4 h has been chosen as threshold for independent events?

[5, 42] Info regarding the length of the dry period is already mentioned in section 2. Please restructure this part and put all the data regarding the study case in Section 2, and leave only the methodology description in Section 4.

[6, 164] No need to repeat Storm Water Management Model

[7, 165] Sentence not clear. Please rephrased it.

[7, 171] GLM is defined only in page 9, line 214. Please add here the extended name.

[8, 172] The GLUE is well described only in Section 4.5. Here it is mentioned as abbreviation without description before. Please fix this issue and refer to section 4.5 and to some references for a description.

[17, 387-389] I assumed these lines are related to the table? In case, please include them in the caption (and rephrase them).

[Methodology, 5.4] please avoid brackets in the titles of the subsections.

[23, 516] representS

[23, 516-517] why? Please justify this sentence

[Conclusions] Please add in the first paragraph of this section the motivation and the questions that this study aimed to answer, and include a discussion about the possible limitations, impacts and possible improvements.

References:

Berne, A., Delrieu, G., Creutin, G., and Obled, C.: Temporal and spatial resolution of rainfall measurements required for urban hydrology, *J. Hydrol.*, 299, 166–179, <https://doi.org/10.1016/j.jhydrol.2004.08.002>, 2004.

Cristiano, E., ten Veldhuis, M.-C., and van de Giesen, N.: Spatial and temporal variability of rainfall and their effects on hydrological response in urban areas – a review, *Hydrol. Earth Syst. Sci.*, 21, 3859–3878, <https://doi.org/10.5194/hess-21-3859-2017>, 2017.

Ochoa-Rodriguez, S., Wang, L., Gires, A., Pina, R., Reinoso- Rondinel, R., Bruni, G., Ichiba, A., Gaitan, S., Cristiano, E., Assel, J., Kroll, S., Murlà-Tuyls, D., Tisserand, B., Schertzer, D., Tchiguirinskaia, I., Onof, C., Willems, P., and ten Veldhuis, A. E. J.: Impact of Spatial and Temporal Resolution of Rainfall Inputs on Urban Hydrodynamic Modelling Outputs: A Multi- Catchment Investigation, *J. Hydrol.*, 531, 389–407, 2015.

Schilling, W.: Rainfall data for urban hydrology: What do we need?, *Atmos. Res.*, 27, 5–21, 1991.