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Comment on hess-2021-99

Anonymous Referee #2

Referee comment on "Advanced sensitivity analysis of the impact of the temporal distribution and intensity in a rainfall event on hydrograph parameters in urban catchments" by Francesco Fatone et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-99-RC2, 2021

Manuscript: HESS-2021-99
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General notes:

Review of 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" by Fatone et al.

This manuscript assesses an interesting and pertinent topic. The research proposes a method to determine a novel sensitivity coefficient to assess the variability in hydrodynamic model outflows for calibration purpose based on rainfall intensity and distribution as well as the uncertainty in model parameters. The analysis is based on the application of a SWMM model of the southeastern part of the city of Kielce (Poland). The authors provided an extensive literature review of their topic and methodology, and systematically compared their results to previous works, which add a broader perspective on their research results and increased the value of their results.

I recommend the publication of this paper in HESS, however, some improvements in the manuscript structure and discussion as described below could help improve its quality and clarity.

Additionally, the paper should be reviewed thoroughly by a Native English speaker in order to improve its style and clarity. I am not a native English speaker, but below are some adjustments I do suggest.

Abstract:

Be more specific on how your results can improve real-world applications of hydrodynamic models in order to further highlight the benefits of your results in the field of hydrodynamic modeling. Study object: Can you be more specific on how the water is flowing in your SWMM model, i.e. water from pervious area flow toward impervious area or is it the contrary?

Methodology:

Section 4.2:

Regarding the sensitivity of the model sensitivity coefficient to the rainfall spatial distribution and intensity; the section 4.2 (p. 6) describes well the first aspect, but the method describing how the rainfall intensity was assessed only come later. Can you review the structure of the text to present how the variability of the different rainfall parameters are taken into account and compared closer together? Maybe you could start by presenting the general methodology applied, and then be more specific in each section.

Section 4.5:

Can you explain why the pervious coefficients had smaller impact on the results and were not calibrated?

Section 4.6:

Can you move the section 4.6 closer to the case study section as those two are related.

Result and discussion:

Can you further discuss why the parameters sensitivity varies from one SWMM parameter to the other according to the type of rainfall distribution (Fig. 4. e)-h))

Summary and conclusions:

Usually, modelers should calibrate hydrodynamic models for rainfall events that are relevant to the water management/design problems that the model will be applied to solve. For instance, if the model is used to simulate intense rainfall events for pipe design, the calibration should take into account these types of events. How your results relate to the type of rainfall events that will be used in modeling applications? In other words, are your results more relevant for hydrodynamic models calibrated with less intense rainfall events, such as those used in the design of green infrastructure and/or for simulation work based on more intense rainfall events such as those used in the design of pipe diameter or storage tank volume? Can you develop on real-world applications in your discussion or conclusion?

Specific notes [page, line]:

[1, 24-25] In the abstract, you use the term "greater the intensity and temporal distribution of rainfall". What do you mean by greater temporal distribution?

[2, 40-50] Introduction: This paragraph presents some redundancies and could be shortened.

[4,101] Study object: Rename the section as "Case study".

[9, 207] All rainfall events are 15 minutes in duration? It seems short even for small catchment. Can you justify this choice?

[14, 344] Can you further explain this sentence: "The poorer performance for 30 July 2010 results from the bias of the model output, whereas the maximum stormwater flows were predicted correctly".

Technical corrections [page, line]:

[1, 26-28] In the abstract, please reformulate and clarify this sentence (maybe use two sentences): “Additionally, the calculations confirmed the significant impact of the uncertainty of the estimated coefficient in the simulator on the sensitivity coefficients, which has a significant effect on the interpretation of the relationships obtained. ‘’

[2, 33] Introduction: “[...] there is a need to runoff model.” Replace by something like “there is a need to apply runoff models”.

[3, 85] Introduction: Please add the word “and” in the parenthesis: “(maximum instantaneous flow, hydrograph volume)”.

[3, 90] Introduction: Change paragraph when starting the sentence “Summing up, […]”

[5,116] Study object: Use a hyphen to presents the Manning coefficient range rather than using the symbol of division. Please review as other division signs were found later in the text.

[5,142] Same as above. Change the symbol ”÷” for “-“ when presenting a range of values.