

## ***Interactive comment on “Simplified representation of runoff attenuation features within analysis of the hydrological performance of a natural flood management scheme” by Peter Metcalfe et al.***

### **Anonymous Referee #2**

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The manuscript presents a simplified modelling approach to evaluate the effectivity of spatially distributed runoff attenuation features on a sub-regional scale during rainstorms. The topic and the presented methodology are definitely very interesting for both scientific community and landscape managers. The presented study thematically fits well for publication in HESS journal.

My comments:

I must admit I have some difficulties to follow the text in the first chapters (p. 2-12). Structure of the manuscript is a little bit confusing; it does not follow the classical IM-RAD approach. Same information are repeated on several places, paragraphs are

C1

sometimes too long containing too many topics. Often I am not sure if the authors describe actual research or results from the previous studies (referred as Metcalfe et al., or Hankin et al.). Simplification of the text structure and rephrasing of long sentences would very much help to increase the readability and overall appeal. Concrete examples follow:

C#1: p.3, l. 9: I don't clearly understand which PROJECT you refer to. Is it related to Hankin et al. (2017) or another previous work? Or do you address actual research presented in this manuscript? Similarly, on the rest of p. 3, where several times “objectives of the project” are mentioned. At the moment the text reminds me more of a project proposal than an article. My suggestion is to move most of the chapter 1.1 directly to the Introduction. In Aims and Objectives simply state the “aims, objectives, hypotheses” (even the bullets will make it). I would also omit the hints of the used methods in Introduction (eg. different levels of leakiness through the walls, Dynamic TOPMODEL, Storm Desmond etc.) and leave it for the following chapters. Just to make the text easier to follow.

C#2: p. 4, ch 1.2 – I suggest to move the whole chapter before Aims and Objectives. This is still pure introduction.

C#3: p. 7, 1st paragraph: it was already stated before that distributed modelling is computationally demanding. You have already introduced the simplified approach that you use. This paragraph should be a part of Introduction.

C#4: p. 12 I don't understand how 8 HRU units correspond to the JFLOW simulation. Was JFLOW used on 8 separate subregions? Or are the HRUs related to the TOPMODEL simulation? Please, clarify. What is approximate size of the HRUs (are they similar in size)? Can you include HRUs boundaries on Fig. 3?

C#5: Figures need to be improved. The lines/dots have similar colours (eg. fig 5b – orange, pink). Yellow lines are not visible (fig. 6). Corresponding plots (fig. 4 &6) have different starting and ending dates, precipitation is not consistent. Etc.

C2

C#6: I don't understand to the description of the GLUE results (p.13, l. 13). Why the Ac around 65% gives the best NSE? It does not seem like that on Fig. 5.

C#7: in abstract and introduction you stress out that the unfortunate synchronization of the RAFs overtopping may cause serious problems downstream, therefore the RAFs network must be designed wisely. I do not see how you solved the desynchronization problem in the Results (slightly mentioned in Discussion). Can you please address this issue in more details in Results, Discussion and Conclusion?

Minor and technical comments:

There are many typos and grammatical mistakes in the text, units often follow the number without added space in between (eg. p.4, l. 13-14: 27000m3, 9%). Cited authors in the text sometimes do not agree with the list of references - check the years and Author's spelling please (eg. p. 4, l. 20: Pattison or Pattinson, l. 13: Ghmire, p. 10 l. 9: Binley & Beven should be Beven & Binley?, etc.). Sometimes decimal separator for thousands is used (p.4, l. 17), mostly not.

p.1 Abstract: The abstract is very well written, I enjoyed reading it! Only the last sentence is misleading. At the moment "ways in which features could be grouped more strategically" are not given in the manuscript (there are general hints which are not supported by the simulation results). This sentence should be excluded or (preferably) the information included in the manuscript.

p.2, l. 25: If JFLOW analysis and the workshop were used for this study, the information should be moved to Methods, rather than to state it in Introduction. The workshop and it's outcomes are not further mentioned.

p.2, l. 30: The sentence repeats the information from the previous sentence (as RAF is also flood mitigation measure).

P3, l. 11: word repetition (would)

p.4, l. 14: word repetition (in)

C3

p. 5, l. 22: Can you please specify why subsurface routing allows more flexible HRU aggregation in this case? How is it related to this study where the surface runoff is of the primary interest? Is this information related to the following sentence "Of particular relevance. . . ."?

p.7, l. 29: Which "study case"? The case study area has not been introduced yet. The chapter 2.3 mixes introduction and methods together.

p. 8: Can you justify or discuss how multiple RAFs are lumped into single RU? I don't think that the weir equations are necessary to be presented here.

p.11, Study site: describe the instrumentation that provides the validation data, please. How the discharge is monitored (what kind of flume/weir, what capacity)? P.11, l 22. – the other gauge should be already mentioned together with the GM Bridge gauge.

p. 12, l. 20: can you also include the lambda factor values?

p. 13, l. 10: 7 distinct values of Ac are mentioned in the text, only 3 are on Fig. 5.

p. 13, l. 18: This paragraph belongs to Methods

Some literature is missing in the references: Daddson et al. (2017), Beven & Blazkova (2004), EA (2009), Marsh (2016), Beven & Wood (1983), Chapel et al. (2006)

Fig. 3: I suggest to include the HRUs boundaries. Position of the NFMs would be also interesting, but there are maybe to many of them.

Fig. 4: Why are there more red lines? I would think that there is only one observation in the single gauge. The Precipitation bars are too thick. In the given scale the daily precipitation amount on 13th Nov would be app 240 mm.

Fig. 5: What are the thin lines with max excess storage around 0.2 m, visible after Desmond storm? Why are they so different from most of the simulation results (for all the RAFs)?

C4

