

Interactive comment on “Predicting subsurface storm flow response of a forested hillslope: the role of connected flow paths and bedrock topography” by J. Wienhöfer and E. Zehe

Anonymous Referee #1

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Review of the manuscript

“Predicting subsurface storm flow response of a forested hillslope: the role of connected flow paths and bedrock topography”

by J. Wienhöfer and E. Zehe

General Comments This paper focuses on the concept of incorporating preferential flow paths explicitly as distinctive structures in a process-based model. The authors implemented a set of different model setups comparing them to observations during field experiments. Given the importance of this topic in the study of hydrological pro-

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cesses at the hillslope and catchment scale and the few efforts available in the literature to explicitly incorporate preferential flow paths in the model structure, I feel that the paper is certainly interesting for the readers of this journal. The manuscript is well organized, clearly structured and develops logically. The results are nicely discussed at the light of previous literature work. The potentials and limitations of the adopted methods and of the derived outcomes are presented and commented. Except for a few indications reported below, I have only technical comments. So I recommend a minor revision before the publication on HESS.

Specific Comments

In the Introduction (Section 1), a few lines on what is still missing in our conceptualization and understanding of preferential subsurface flow processes should be added.

6489, 4-7. Please, explain why the occurrence of surface runoff is invoked from the observation of Fig. 3f. . . couldn't simply be interpreted as overestimation of subsurface flow?

6491, 1-22. In this Section (4), some concepts are repeated (e.g., lines 1-6, 7-9) and should be avoided. Moreover, the whole section is more methodological than discussion. So, I suggest compacting it and moving it to ones of the previous (methodological) Sections.

6493, 11-14. These two sentences are a little too vague and should be expanded and discussed a bit more.

Fig. 3. Peak discharges produced by the sprinkling experiments and by natural rainfall should be distinguished and indicated in the Figure panels.

Minor and Technical Comments

6475, 25. Zehe and Sivapalan, 2009 is missing in the reference list

6475, 25. Jones, 2010 is missing in the reference list

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6475, 28. Clothier et al., 2008 is missing in the reference list

6476, 1. Uchida et al., 2001 is missing in the reference list

6476, 1. Hencher, 2010 is missing in the reference list

6476, 2. Krzeminska et al., 2012 is missing in the reference list

6476, 10. “A couple of” but the references are more than two.

6476, 17. Change “representative elementary volume (REV)” into “Representative Elementary Volume (REV).”

6478, 11-14. I suggest using bullets to present the paper objectives, to make them also visually clear.

6479, 11. “The hillslope is a subcatchment”. The meaning is clear but terminologically it sounds a bit controversial, since we’re used to thinking of hillslopes as landscape units within catchments and subcatchments. Maybe the sentence can be better reformulated.

6481, 18. “Does” should be “did”

6481, 19-21. “This analysis indicated, however, that the tracer uranine was not retarded compared to conservative salt tracers”. Data of conservative salt tracers are not shown (at least they are not described previously in the section). Please, specify.

6483, 28. Space missing between “connected” and “preferential”.

6488, 6. Define NSE (Nash-Sutcliffe Efficiency Index) here and remove the definition from Tables and Figures captions.

6488, 18. Add “=” between “NSE” and “0.86”.

6491, 19. “Flesh out”. Please, use a more formal verb.

6494, 9. Change “soul” into “soil”.

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6500, 5. “model” should be “modelled”

Fig.1. In the legend, I suggest to change “subcatchment spring” into “divide” or “spring catchment”

Fig. 2. The “little layer” is barely visible.

Fig. 3. Once define in the text, there is no need to define also in the caption what NSE means. The same holds for Table 3.

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