Hydrology and
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Discussions

Interactive comment on "Statistical analysis and modelling of surface runoff from arable fields" *by* P. Fiener et al.

Anonymous Referee #2

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<General comments>

This paper suggests a new statistical model of surface runoff generation supported by a variety of field experiment data and it contribute to our understandings on how surface runoff generates in detail. The topic seems truly interesting and relevant to the broad readers of the HESS.

However, I must admit that this paper seems "underdone" and it would need further refinements before its publication. My major concerns are as follows: (1) the authors were discussing at plot scales but they often describe as if their findings are applicable in more larger scales, (2) experimental set-up is not clear and we can not properly understand their results, (3) some of their discussions seems just based on only their

thoughts and they are left unjustified, hence I had an impression that current paper could be more rigid if the authors cite suitable references as much as possible for more broader discussions in their sections on results and discussions.

<Specific comments>

1. P3667, L5-12 or whole Introduction I think the authors should clarify at which scale you focus on surface runoff? As you mentioned, there are literatures on surface runoff mechanisms but their roles and dominant processes might change with scale. For example, I think "return of subsurface storm flow" would dominate in a watershed scale but it would be negligible at plot scales. I may be wrong but I think your discussion was made only at plot scales. In addition, the authors discussed on the temporal scales of different surface runoff mechanisms. Yet, I could not figure out at which temporal scale you focus. Hence, please consider explaining the temporal scale of your interest in your Introduction. It seems your temporal scale of interest is relatively short such as hourly scale, if I am correct.

2. P3667, L24. I suggest you cite suitable references for the models of "Gren and Ampt", "Philips", and "Horton".

3. P3668, L3668-P3669, L2 I suggest you explain why you take a statistical approach before this part. You discussed on the different mechanisms of surface runoff generation by this line, hence I expected you would explore the mechanism through detailed field observation. However, you selected a statistical approach. We want to share your intention on how to obtain true mechanisms of surface runoff generations and at least I want you clarify this point.

4. P.3669, L4 I wonder if the sub-heading of "Rainfall simulations" are suitable here, as you explain soil properties and independent parameters as well. I suggest you reconsider the sub-heading or the structure of "2. Material and methods".

5. P. 3669, L7 I wonder if Horton-type equations and Green-Ampt-type equations are

enough for your objective and discussions. This decision may narrow the spectrum of your results and your conclusion. I think you should explain for this point here.

6. P3671, L10-20 I think you should explain by using equations, as what you explain here is very complex and it is not easy to understand perfectly without equations.

7. P3671, L21 Please specify what you mean by "the same variables". I can not be confident to specify them from your text.

8. P3672, L3 I think your citation for the "split-sampling cross-validation approach" would be helpful for some of readers.

9. P3672, L21 Please explain how you derived equation (1). Your explanations seem missing.

10. P3673, L7 Please explain Q_P20, Q_P30, and Q_P40, as your explanations are missing.

11. P3674, equation (3) Please double-check the required format of the HESS for this type of equation. It seems underdone for me.

12. P3674, L16-18 I think the author would need to explain this issue at a very early stage of this paper such as "2. Materials and method" with a special focus on the magnitudes of the errors. This would be critical issue of this study, which may control the relevance of your results.

13. P3676, L5-8 I think you should explain this part in method (and introduction) about the 2-step procedure. I think this is an explanation of method.

14. P3676, L9-10 I think you should explanation why runoff rates and volumes decreased with increasing C_org for readers.

15. P3676, L23-24 I think you need to explain why "Runoff volume again was modeled more accurately than runoff rate".

16. P3677, L3-27 I think you should discuss about the scaling issue in hydrology first and then you focus on your scale of interest here. Also, I think you need to explain the experimental set-up in detail here or somewhere else such as your section 2. Some photos, diagrams, or sketches would be helpful to imagine the experimental environment for us.

17. P3678, L5-6. Please cite a suitable reference for "many other surface runoff estimates".

18. P3679, L15-19 I think this is one of your major contribution to current hydrology and I suggest you highlighting more in abstract and results by allocating more sentences.

19. P3679, L29-P3680, L7 These discussions would be beyond our understanding or imagination, as you did not explain enough for the experimental set-up for the field data corrections. I think your detailed explanations are necessary in the Section 2 to share the prerequisite of this research with readers.

20. Whole Please check technical errors you made in the paper by tracing all words in the paper. Some examples are listed in my list of <technical corrections>. Also, there seems to exist some grammatical error in the main text, hence I suggest you to have an English proofreading service.

<Technical corrections>

21. P3668, L.3 surface generation → surface runoff generation?

22. P3668, L5 Largerscale → Larger scale?

23. P3672, L16-17 It looks as (range 0...25 %) and (0.063...2 mm) on my computer display. Are these same as you typed? I think "-" or "∼" would be better here. To be accurate, please check the guideline for authors of HESS, too. Also, my display shows "!!!" just after (range 0...25 %) and hence it may be caused by the difference of language environment. Please double-check these points if you revise the paper.