Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2019-203-RC1, 2019

Hydrology and Earth System Sciences
Discussions
Open Access

Interactive comment on "Intra-catchment variability of surface saturation — insights from longterm observations and simulations" *by* Barbara Glaser et al.

Anonymous Referee #1

Received and published: 21 June 2019

Note to editor: as I was not able to rate the article with "moderate revisions" I chose major revisions.

General comments

The article by Glaser et al presents an interesting analysis of the spatial and temporal variability of surface saturation dynamics in a small forested catchment in Luxembourg. The study of surface saturation patterns and development is certainly a relevant topic in hydrological research and I really appreciate the contribution of the authors in terms of the large amount of field data and observations. The authors use an impressive dataset of hydrometric information (continuous data of discharge, water table, soil moisture (at

Printer-friendly version

Discussion paper

different profiles)) at several locations within the catchment. Additionally, they include an interesting and somehow novel methodology to map surface saturation over specific areas (through thermal infrared images). The high frequency of these images (a total of 291) allows them to nicely catch the temporal dynamics of surface saturation patterns over several years. All these is very valuable. They also use a hydrological model to investigate the generation and development of surface saturation. The model is validated not only with the stream discharge, but also and, interestingly, with "internal" information (groundwater, soil moisture and saturation patterns) within the catchment.

1. My main criticism is that the presentation of the results + discussion is somehow a bit mixed up and I think a better structure will help the reader to follow more smoothly the story (which is complex in terms of the quantity of data used, number of riparian areas and variables analyzed). An easy way to ensure a good structure is once the objectives are clearly stated, used them to structure the Results, Discussion and Conclusion sections. Eg, Objective 1, 2, 3 –> corresponding Results 1,2,3 –> corresponding Discussion 1,2,3 etc. Here I really think a better correspondence Results-Discussion-Conclusion is needed.

2. Also, I′m not sure whether the main objectives are sufficiently clearly formulated. As far as I understand, the ultimate objectives of the paper are to analyze the variability of surface saturation dynamics and patterns within a forested catchment (this is clearly stated), but also to explore (identify and discuss) the possible factors controlling the generation of surface saturation (this is done through the analysis of the matches and mismatches of observations and model simulations). This is not specified in the objectives and I think it is important.

3. My last main criticism is that the authors do not sufficiently justify the novelty of this study with respect to previous studies (eg., Glaser 2016, 2019). There is only one sentence in L42-43 but is not very convincing. It is important they reinforce this idea (eg, why it is important to do the analysis in a larger catchment? What do you expect as a new finding?).

Given this, my recommendation is moderate revisions are needed.

Specific/minor comments: Title: I do not think we can we consider 2 years as “long term” period of observations and simulations. Consider the possibility of changing the title according to my comment 2. Abstract: you do not mention that you also analyze the relationships between surface saturation and discharge and groundwater p.3L27. Is it not the hydrological year 2016-17 (starting Oct 2016)? p.5L7. can you give an aprox surface of the riparian areas (and/or TIR images)? p.6Fig2. for a clear reading in the text it would be helpful to add a), b) and c). Is it mC or Cm? (homogenize with the figure caption, text and tabl 1). Define LP? p.9fig3. Is there a way to indicate at which swc is there saturation? P11fig4. Can you remind in the fig caption that the colors correspond to that of Fig 1? P17L23-30. I believe microtopography can be an important factor at small scales (small study areas) so be sure (and indicate) that the examples you give to discuss this (L24-27) are also carried out at the small scale. I would say at larger scales the main factors explaining the extent/variability of surface saturation are catchment slope, climate, land use... P18L3. “A simulate surface extension of 1.6%”. As far as I remember from section 2.1, you include an exceptionally dry year (?). You should mention this. P18L24. “the frequency maps of surface saturation”. Specify you are referring to the images in fig 6 (otherwise the reader may think it is Fig 7). P19L14. “observed frequencies” of surface saturation (?)

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2019-203, 2019.