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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Partitioning the forest water balance within a boreal catchment using sapflux, eddy covariance and process-based model" *by* Nataliia Kozii et al.

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The authors studied a boreal forest in Sweden where they executed a detailed study on the partitioning of ET. They measured total ET by means of an EC-system, canopy transpiration by sapflow, and also considered ET from the forest floor. As comparison they applied the APES model to compare they finding. In general, I welcome the study a lot especially, since it are one of the few studies that also consider below canopy evaporation processes in both measuring as modelling. Nonetheless some improvements can be made.

Main concerns:

- L146: the author only consider the growing season. I think it's important to emphasis throughout the paper.

- L176: I am happy to see that below EC-system latent heat is considered. However, equation 1 is only valid once the forest is homogeneous since the footprint of the EC-system and the below canopy latent heat are different. How 'homogeneous is your forest? Please elaborate.

- L199: the TF-sampling was done on 'event-base'. Please elaborate on how this was done. Did you run into your forest after rain ceased? Or did you do daily observations? How did you defined 'an event'?

- L207: How did you tested whether ALS had the highest correlation with seasonal interception loss?

- L220-285: Please have a look at the recent technical note by Larsen et al 2019. Would it be necessary to compensate your sapflow measurements as well? Not doing this could mean an overestimation of your transpiration.

- section 2.3: a better explanation of the modelling principles of APES, would help the reader. For example showing model-scheme.

- section 2: I think it would help to make a schematic picture (a bit like figure 5) of how you define ET and its subcomponents.

- L376-380: be careful with your definitions of transpiration, evaporation and evapo-transpiration. ETu is a combination of forest floor interception, understory transpiration (mosses) and soil evaporation and is thus not only 'evaporation' as said in L378. Also the role of soil evaporation is not explained. Is soil evaporation relevant in your study site? Why/why not.

- Section 4: the discussion and conclusions are merged into one section. I think it would be better to split this. And/or merge the discussion with the results section. But for sure make a separate section for the conclusions only where you are only answering

to the research objective.

Specific (minor) comments:

- L31: redundant to mention "and being roughly 7 times greater than stream runoff". This is the same info as saying ET is 85

- L44: Maybe better to mention the spread in global ET. This is ca 55-80

- L71: after e.g. a comma.

- L128: unit of annual rainfall is mm/year.

- L157-165: variables like P, Q, dS, etc should be in italic.

- L165: I prefer to rename dS into dS/dt, since dS is the storage change per time.

- L172: details => detail.

- Fig S1: the unit of P is mm/y. Furthermore, I would change instead of showing Q/P, showing ET/P. Since this the focus of the paper.

- L337-342: This is a result.

- Fig3c: why showing IL+ETu? Why not only ETu? This would more sense in my view.

- Section 2/fig 3: explain how ETu is 'measured'. It's calculated as ETu=ET-IL-T, right? Please add this equation and elaborate on the fact that ETu is thus not independent of the other measured components.

- Figure 5: I would add the percentages as well. Furthermore, be consistent in the naming of ET and its subcomponents. Would it not be better to use here the abbreviations?

References:

Gleick, Peter H. Water in Crisis: A Guide to the World's Fresh Water Resources. New York: Oxford University Press, 1993.

K. Larsen, E., Palau, J. L., Valiente, J. A., Chirino, E., and Bellot, J.: Technical note on long-term probe misalignment and proposed quality control using the heat pulse method for transpiration estimations, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2019-257, in review, 2019.

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