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Interactive comment on "Effects of vegetation and soil on evapotranspiration, flow regime, and basin storage in three nearby catchments in northeast Japan" *by* Shoji Noguchi et al.

Anonymous Referee #1

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The study carried out by Noguchi et al. consists of observations in three catchments of the Nagasake experimental watersheds in Japan. Diameter-at-breast height, sapwood area and soil properties were obtained. Evaporation was determined with a water-balance based method and basin storage was determined with an analytical relation between rainfall, stormflow and storage. The article is rather brief, and the added value and efforts of field campaigns may be clear. Nevertheless, I'd like to raise several issues that require some attention of the authors.

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Discussion paper

1 General remarks

In general, additional explanations are in some cases required. And even though the measurements and experiments are very valuable on its own, the authors merely don't fully manage to address the added value of the findings. To a large extend, the article is very descriptive, mentioning the numbers and outcomes of the measurements. The implications of these results don't become directly clear to the reader. The missing *Conclusions* section probably reflects this issue the most.

Some confusion is introduced in section *2.5.1 Evapotranspiration*. At first, it is described that total evaporation is estimated based on the assumption of no storage change between periods where q(t) and dq/dt are equal. This is a rather strong assumption, which may require some more supportive explanation. My first feeling is that I can draw many different hydrographs between t1 and t2 with the same slope and same discharge value, which may or may not cause a storage change, depending also on the rainfall in this period and evaporative energy. So please explain the method more detailed and add where these assumptions are based on, or add some references (not only written in Japanese) that do so.

Secondly, in lines 10-13, p5, a rather different approach is mentioned, not in line with the theory explained in the paragraph above. Instead of selecting start and end dates with the same values for q(t) and dq/dt, it is described here that start and enddates are selected based on rainfall rate and similar values of q(t). What is the reasoning behind this? In addition, why are periods < 10 days and >60 days excluded? Please add some more explanation in this paragraph why you made some choices.

After reading the discussion in 4.1, I would like to point at some aspects of the presented findings that are not discussed at all, but seem very interesting to me. It is pointed out in p8, lines 14-18, that the total evaporation is lower in catchment 3 due to lower sapwood area . Even though this is true, the total evaporation is just slightly smaller, whereas sapwood area is much smaller. It also mentioned that catchment 3

has a higher tree density. In addition, when looking at fig 4a, it seems that catchment 3 has more small trees, and catchments 1 and 2 more big trees. Therefore, my first guess would be that catchment 3 is a younger system, more effectively transpiring compared to catchments 1 and 2. Do you think this can play a role here? At least, it might be interesting to reflect on this.

I also wonder what is meant when 'basin storage' is discussed, in sections 3.3 and 4.2. At first, I thought you are discussing the maximum storage capacity of the basin, but eventually three different values are found based on the initial runoff. Therefore, is it the current active basin storage that is discussed? Please clarify this in your methods as well. In addition, how comparable are soil storage (which is a capacity) and, if meant so, the actual basin storage S_B?

Finally, throughout the paper, the terms transpiration and evapotranspiration are used. Please be aware that in some cases 'evapotranspiration' is used, whereas actually 'transpiration' is meant. For clarity, it might be better to use the term 'total evaporation' when the sum of interception evaporation, soil evaporation and transpiration is meant. I would like to point at Savenije (2004) for some more additional arguments to not use the term 'evapotranspiration'.

Concluding, the results presented in the paper are probably interesting for HESS, but the authors should put quite some effort in clarifying their methods and assumptions, and emphasize more on their key findings as well.

2 Detailed comments

Page 1, line29 –Page 2, line 2: you only refer to Japanese cases, for a more total picture, it might be good to refer to some other experimental watersheds as well (Hornbeck et al., 1997; Patric and Reinhart, 1971; Rothacher, 1970).

Page 2, line 16-17: “thus, percentage . . .water yield”, this sentence seems a bit odd to me, rephrase?

Page 3, line 26: remove “of”

Page 5, line 30: which upper limit and towards what does the curve converge?

Page 5, line 34: please define if SB is the maximum basin storage (the capacity) or the current amount of storage in the system.

Page 5, line 25: It seems a result to me that there is an inflection at 12 and 72 hours after a storm. Is this the case for all three catchments? Maybe add a graph here as well.

Page 6, line 7: What do the percentages between brackets mean?

Page 6, line 19: You probably mean that the “mean transpiration is estimated by”

Page 7, lines 9-13: How is this basin storage determined? Do you fit Eq.10 to your data to obtain SB ? Please mention this in your methodology.

Page 7, line 15: ‘that geology have’ –> ‘that geology has’

3 references

Hornbeck, J. W., Martin, C. W., and Eagar, C.: Summary of water yield experiments at Hubbard Brook Experimental Forest, New Hampshire, Canadian Journal of Forest Research, 27, 2043-2052, 10.1139/x97-173, 1997.

Patric, J. H., and Reinhart, K. G.: Hydrologic Effects of Deforesting Two Mountain Watersheds in West Virginia, Water Resources Research, 7, 1182-1188, 10.1029/WR007i005p01182, 1971.

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cific Northwest, Water Resources Research, 6, 653-658, 10.1029/WR006i002p00653, 1970.

Savenije, H. H. G.: The importance of interception and why we should delete the term evapotranspiration from our vocabulary, Hydrological Processes, 18, 1507-1511, 10.1002/hyp.5563, 2004.

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