Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2019-651-RC2, 2020


Hydrology and Earth System Sciences
Discussions



# *Interactive comment on* "The effect of rainfall amount and timing on annual transpiration in grazed savanna grassland" *by* Matti Räsänen et al.

**Anonymous Referee #2**

Received and published: 19 June 2020

The authors study the effect of rainfall amount and timing on transpiration in an area (South Africa) where not much knowledge is known on this topic. Therefore, topic-wise I very much welcome this study. However, the way the study is done, how it is presented, and how it's discussed needs major improvement.

Major points of attention:

1) The authors study ET-partitioning; however, they seem to only consider transpiration and soil evaporation. What about interception? Also in Savanna-areas interception can play a big role (15-30%). See for example the work of:

- Bulcock, H. H. and Jewitt, G. P. W.: Field data collection and analysis of canopy and litter interception in commercial forest plantations in the KwaZulu-Natal Midlands,



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Discussion paper

South Africa, Hydrol. Earth Syst. Sci., 16, 3717–3728, https://doi.org/10.5194/hess-16-3717-2012, 2012.

- Tsiko, C.T., Makurira, H., Gerrits, A.M.J., and Savenije, H.H.G. (2012): Measuring forest floor and canopy interception in a savannah ecosystem, Physics and Chemistry of the Earth, Vol. 47-48, 122-127

I think the authors should include interception in their analysis if possible and/or clear discuss this limitation and influence on the found results

2) I am puzzled by Table 1.

- How is it possible that ET>P on an annual time scale?!?! This can only be the case when irrigation is applied. However, no information is given on this. And in case irrigation is used, this should be added to P. Maybe I misunderstand something, but I think it is highly surprising that the authors do not explain this. They only state that P<ET (P9L5). Where is this water coming from? On an annual basis ET<=P, when you assume no discharge and storage change. Or are the ET values wrong due to the non-closure of the eddy covariance? Please explain this, quantify it and adjust your results (e.g., in case of an EBC-problem distribute the non-closure to H and LE based on the bowen ratio.

- The entire study build upon this ET that is larger then P, so I think the meaning of the T/ET-ratios are not meaningful.

- Furthermore, I do not understand the values of P. In the caption it is written that these are the values of the cite and that the values between brackets are from a nearby site. However, in the text (P9L1) the author say that the nearby site has higher rainfall amount, which isn't shown in the table. Please clarify, check and possible correct.

3) Presentation: Honestly, I am not an expert in the applied methods to estimate transpiration; however, I am familiar with ET-partitioning. Having said this, I think the authors can do a better job in explaining their used methods, so it's better understandable

for a broader audience.

Minor:

- abstract: It's good practice to add the knowledge gap in your abstract (i.e. "missing knowledge on carbon uptake")

- units: throughout the manuscript the units are not correct. When speaking about annual rainfall/ ET, T, E the unit is mm/YEAR and not just mm. Please correct

- style: the HESS style states the parameters (ET, P, T, etc) should be in italic.

- P2L6-7: I do not understand this sentence.

- P5L3: What is WPL?

- P5 eq 1: add units to all symbols

- P6L8: I am not getting this. E_u,k should be unitless if I see eq 2...

- P6L9: Explain MDS, LE, and add that sigmaˆ2 is variance

- P7L4-6: what is the naming of this method uWUE or uWUEp. Please be consistent

- fig 2: y-axis should be labeled: Accumulated monthly transpiration [mm]

- fig 7: what is the reasoning for using power-functions and not e.g., linear ones?

- fig 9: unit of y-axis is mm/day

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