

Berkeley, California

07 December 2021

Dear Prof. Dr. Harrie-Jan Hendricks Franssen, Editor,

We are pleased to submit minor revisions for the manuscript hess-2021-55, *Drivers of drought-induced shifts in the water balance through a Budyko approach*, for publication in HESS.

We have revised the introduction and conclusion of the manuscript based on comments from the referees. We appreciated this new round of feedback and would like to thank you and the referees for the time and thoughtfulness in reviewing our manuscript. We confirm that all requested changes were feasible.

Please find below our point-by-point replies, including references to changes in the manuscript. Reviewer comments are italicized, and our responses are in plain text. We have also submitted a tracked changes version of the manuscript. Please note that no changes were made to the supplement, and, as such, no new version was uploaded.

Regards,

Tessa Maurer on behalf of the co-authors

Reply to Reviewer 2

The authors carefully responded to my reviewer comments (and those of the other reviewers), which improved the manuscript, but the same main concerns raised by myself and reviewer #3 seem to largely persist, and I do not see how they can be fundamentally addressed within a further revision of this paper. While the paper still seems overall a useful contribution, I suggest publishing the paper as is.

Public response: We thank the reviewer for their feedback and the effort in reviewing our original submission and revised version. No changes were made in response to this comment.

Reply to Dr. Teuling (Reviewer 3)

The author's have generally provided a good response to the issues raised in my previous review, and also to the other reviewers' comments (at least this is my impression after a quick read). The reasoning behind model and data choices are now made more clear, and uncertainties are communicated better. Overall I am satisfied with the new version, except for the fact the manuscript would benefit from a more clear description of the research questions or if possible main hypothesis to be tested (in the final paragraph of the Intro), and a slightly more extensive conclusion section that reflects back on the RQs before answering them. The conclusion section now reads somewhat cryptic, and it is good practice to make this a text that can be read in isolation from the rest of the manuscript. And while the RQs are currently mentioned, the use of similar wording earlier on in the Intro (like "In this paper, we argue...") is confusing and should be avoided. This makes it seem like the goal of the paper is to argue, rather than to provide evidence. This sentence could potentially be moved to the last paragraph of the Intro, after the RQs have been introduced. I hope this helps to further focus the text, and improve the impact of the conclusions.

Public response: We thank Dr. Teuling for his additional feedback and agree that both the research questions and conclusion could be stronger. We have revised unclear phrases in the introduction (line 45) as well as edited the final paragraph of the introduction to explicitly state our hypothesis (lines 77-8) and clarify our research questions (lines 83-7). We aimed to make the questions clearer and avoid any language that is not already generally established in the literature.

We also significantly revised and expanded the conclusion (lines 525-47) to improve clarity and ensure the conclusion may be read separately from the rest of the paper. This included expanding and clarifying our findings (e.g., lines 526-8; 532-3; and 541-4) and including a brief discussion of future research directions (lines 544-5). We specifically aimed to restate our research aims (lines 526-7; 531-2; and 538-9) as we report on our findings.