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Interactive comment on "Regional scaling of annual mean precipitation and water availability with global temperature change" *by* Peter Greve et al.

Peter Greve et al.

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Dear reviewer,

thank you very much for the positive evaluation of the manuscript and your comments, which will help to improve the article. We will address all your comments in detail in our final response and focus on the major issues in this comment.

Regarding the question why we omit regions with P-E<0: Since we focus on global land, we omit locations where P-E<0, since such conditions are generally not present over land at yearly or longer time scales. However, in order to also represent the

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scaling over oceans, we will reproduce Figure 2 as a supplementary figure for oceans only. We will now further mention throughout the manuscript that our main focus is on global land areas.

The reviewer asks for a more appropriate way to visualize the regression slopes and their uncertainty: In all dP versus T plots the main assumption is that P is known in case global mean temperature dT=0. We understand that this might be unrealistic. However, we focus on the relative changes in P with changes in T and our approach provides an option to illustrate the uncertainty distribution as a function of temperature change. The violin plot nicely illustrates the uncertainty distribution basically for dT=1K, whereas the dP vs. dT plots illustrate the uncertainty distribution for every dT between 0K and 6K, which, in our assessment, makes it easier to assess probalities/risks as a function of dT.

Regarding potential changes in the variance of P: If the variance increases over time, the uncertainty of the sensitivity coefficient (estimated through resampling residuals) consequently also increases. However, this will not necessarily influence the decomposition of the uncertainties unless changes in precipitation variability are different between scenarios or models.

We will further adress all minor corrections and typos in the final response. Thank you!

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