

Interactive comment on “Does the Budyko curve reflect a maximum power state of hydrological systems? A backward analysis” by M. Westhoff et al.

Anonymous Referee #3

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Westhoff et al. present an analysis based on maximum entropy production principle of the Budyko curve using a steady state mass balance model and the assumption that evaporation is at its maximum when the soil is fully saturated and the soil chemical potential is zero. I find this an interesting study, though I doubt that the content warrants a research paper. To me this looks more like a technical note, even if there is comparison to observations. Below are additional more specific and general comments.

Simplifying assumptions are central to the analysis, such as the one mentioned above and h being a linear function of Gr . Perhaps, the authors could touch on possibilities to evaluate the impact of these assumptions on the results and relax them in future

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studies.

The authors should state clearly right at the beginning, which parameters are known (chem. pot. atmosphere and Q_{in} , in my understanding) and which are unknown/they are solving for.

In order to arrive at eqns 13 and 21, the authors need to introduce an additional equation i.e. eqn 11. This seems arbitrary to me; please comment on that. What are the reference power and conductance?

Isn't it a given that if one applies eqn (9) then finds an expression for E_{pot} for a known Q_{in} that the results are consistent and fit the Budyko concept? In this context, what is $G_e(h^*)$? I am somehow missing a functional relationship for $G_e(h)$ or soil chemical potential as a function of h .

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