

Interactive comment on “A Budyko framework for estimating how spatial heterogeneity and lateral moisture redistribution affect average evapotranspiration rates as seen from the atmosphere” by Elham Rouholahnejad and James W. Kirchner

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General concern:

Anonymous Referee # 1 pointed out the “inherently hypothetical” character of the moisture redistribution section of our paper, as we ourselves noted in the manuscript (P12, L18). The question of how real-world lateral redistribution fluxes might compare to the optimal fluxes that are calculated in our analysis is of course interesting, as the referee

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notes. However, for the reasons that we state in the paper, actual rates of lateral redistribution in the real world remain highly speculative. Thus we see no practical way to determine whether "landscapes naturally organise themselves to generate an optimal flux or not", as the referee puts it. We see no reason to argue that they do so, or that they should. In any event, as the reviewer notes, these questions are outside the scope of the current paper.

Specific comments:

- The Beven (1995) paper is a useful treatment of the sub-grid closure problem in hydrology and can be added to the manuscript, although the manuscript does not concern hydrological modeling per se.
- Method of moments: there appear to be different understandings of this term, so to avoid any confusion, we will instead use the more technical terminology: second-order, second-moment error propagation.
- Harmonic difference: here we knowingly coined a phrase, modeled after the well known harmonic average (that is, the reciprocal of the average of reciprocals). However we can remove it in the interests of simplicity.
- Use of color in figures: HESS prints figures in color so this should not present a problem.

Technical correction:

- P/PET as aridity index: the use of "aridity index" to describe P/PET has been standard terminology in the hydrology and atmospheric science communities ever since UNEP (1992). We agree that this ratio is more properly characterized as a humidity index, as high values of P/PET characterize conditions of high humidity, not high aridity. Nonetheless, the term "aridity index" is more widely used than "humidity index" to describe P/PET.
- Reference and citation formatting issues: we evidently had some difficulties with our

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bibliographic software. These glitches will be fixed.

Reference: UNEP: 1992, World Atlas of Desertification. Edward Arnold, London.

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