

Hydrol. Earth Syst. Sci. Discuss., author comment AC2
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Reply on CC1

Isaac Kipkemoi et al.

Author comment on "Climatic expression of rainfall on soil moisture dynamics in drylands"
by Isaac Kipkemoi et al., Hydrol. Earth Syst. Sci. Discuss.,
<https://doi.org/10.5194/hess-2021-48-AC2>, 2021

We thank the community reviewer for their useful comments. Below in **bold** are our response to the each of the comments.

The paper is well researched and concisely written. It gives critical climate variability dynamics in drylands that surge extremes and applications for forage and agriculture.

The authors have keenly selected a widely applied model that gives discourse on soil moisture and temporal rainfall resolution.

We thank the reviewer for taking time to give the above two comments. Indeed, our goal was to explore how using precipitation data resolved at different temporal resolutions (hourly, daily, weekly) affects estimates of soil moisture and plant-water availability particularly in dryland regions. As also highlighted by one of the reviewers, the issue of how temporal resolution of precipitation data can impact simulated hydrological responses (i.e., soil moisture dynamics) especially in climate change studies is often overlooked. The reason for initiating this research was to underscore importance of using datasets that are representative of dryland hydrology (Blöschl and Sivapalan, 1995). This included identifying the critical timescale of precipitation data needed to assess water availability to human society in these vulnerable regions.

However, the authors mention Richard's equation model that informs the Hydrus-1D, yet the explanation is limited and doesn't come out clearly, I would appreciate the authors to give some of the underlying equations.

Thank you for this comment. We have left out widely published and well-known equations in this manuscript so that we could only directly address the problem at hand. This helps the readers to focus on our main contribution to the paper (i.e., the impact of precipitation resolution on soil moisture dynamics and consequences for different storminess scenarios in the future). The inclusion of previously published material would have made this paper unnecessarily long and redundant. We direct this and other readers to the widely published material on Hydrus-1D. In our paper we merely mention the key equations. Hydrus-1D solves the Richards equation and includes Darcy's Law within the sink term in

Richard's equation (Šimůnek et al., 2012; Wang et al., 2009).

Based on the contribution of this paper to dryland hydrology and the Author's responses to first referee, I recommend this paper for publication.

Thank you.

References

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