

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
<https://doi.org/10.5194/hess-2021-639-RC1>, 2022
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Comment on hess-2021-639

Anonymous Referee #1

Referee comment on "Impact of distributed meteorological forcing on snow dynamic and induced water fluxes over a mid-elevation alpine micro-scale catchment" by Aniket Gupta et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-639-RC1>, 2022

Assessing the impact of meteorological forcing on simulated water and energy budgets particularly in mountainous catchments is important. While authors have addressed an important topic, the study falls short on performing a comprehensive quantitative model evaluation compared to observations. Furthermore, broader implication of the results have not been discussed.

Authors performed a limited sensitivity experiment at a small catchment scale to assess the impact of distributed meteorological forcing on simulated water and energy budgets. Although authors performed a number of scenarios, results mostly analyzed qualitatively without providing further insights.

Authors have mostly used qualitative assessment to compare simulation results. Further quantitative assessment of catchment average and spatially distributed data are needed to understand the impact of spatial heterogeneity of meteorological forcings.

Model evaluation against observed evapotranspiration showed that all model scenarios overestimate ET. Therefore, no further improvement has been achieved by using distributed forcing.

The thickness of the last subsurface layer is 110 m. At this resolution, groundwater system is simulated as a single reservoir. I wonder why authors needed to use ParFlow.CLM for such a simple parameterization of the subsurface. I agree with authors that simulating lateral flow processes in these steep catchments are important. However, they did not show sensitivity of lateral flow simulations in their simulation scenarios.

Given the small size of the catchment, it is difficult to use existing gridded meteorological products to assess the impact of distributed forcing on simulated results. However, given the size of the model, authors could expand the extent of their sensitivity analysis and perform additional scenarios.

Specific comments:

State in the abstract that the impact of precipitation, wind and shortwave radiation were explored.

Line 75 – This is the common land model not the Community Land Model

Line 225 – How did you assess equilibrium state?

Line 255 – Please change “subsurface stock” to “subsurface storage”.

Line 230 – Differences among various simulation scenarios are not entirely clear. Please clarify.

Do you have any runoff observations in this watershed?