

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2  
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## Comment on hess-2021-501

Anonymous Referee #2

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Referee comment on "The effects of spatial and temporal resolution of gridded meteorological forcing on watershed hydrological responses" by Pin Shuai et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-501-RC2>, 2021

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This paper investigates the impacts of meteorological forcing in simulating rainfall-runoff behavior using the ATS model. Three different datasets are used to test the effects of spatial and temporal resolution of gridded meteorological forcing on surface runoff and other related hydrological processes. This is an interesting piece of work that provides certain decision support for the application of meteorological forcing.

There are four main issues with this paper:

- This study only tested on the Coal Creek Watershed, which has a relatively small size of about 53km<sup>2</sup> and receives a high proportion of snowfall during cold season. Would the results be different if the gridded meteorological forcing was tested in other catchments? Is the result for individual catchment representative of general trends?
- The performance criterion is critical for model application. This study took modified Kling-Gupta efficiency as objective function to evaluate the model performance, which means that you specially focus on water balance. The results can be very sensitive to the selection of objective function. Have you considered some other performance criteria? Do they show different comparisons?
- The authors say that "The models were not calibrated because the focus of this study was to evaluate the effect of meteorological forcings on model simulation instead of estimating the optimal parameters used in ATS. " The simulation results may vary for different parameters, and the parameters calibrated for different spatial and temporal resolutions may also be different. It can be seem from the hydrographs that the simulated discharge differ significantly from the observation and are underestimated for most of the time period. Does it have any effect on the results if the model parameters are calibrated in advance?
- The authors used different meteorological forcing to compare the effect of different temporal and spatial resolutions on the simulation results, which makes it difficult to state which is the greater impact to the simulation results. It is recommended that improvements in model performance at different temporal and spatial resolutions be investigated on the basis of the same data sources.

Specific comments:

- The catchment is very small, what is the average time of concentration for the floods? Does it have an impact on the comparison of daily flood simulation results?
- The grid size of NLDAS is larger than the actual area of the basin, it doesn't seem appropriate as a grid input.
- For Figure 4(also Figure 8 and 13), is it possible to show all the simulation results in one graph to have a better comparison of the different results?
- It is difficult to distinguish the differences between the results in Figure 11. Is it possible to have a better comparison by using flow duration curve?