

Interactive comment on “Examining cross-scale influences of forcing resolutions in a hillslope-resolving, integrated hydrologic model” by Miguel A. Aguayo et al.

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Regarding the first question of the referee, the real resolutions for atmospheric forcings are 9 km, 3 km, 1 km, and they were used as input for 250 m, 90 m and 30 m surface hydrologic model. In addition, we interpolated 1 km atmospheric forcing to 30 m and use that dataset as input for 30 m surface specifically to generate the reference, and also we use this interpolated forcing data to run the hydrologic model to a 90 m and 250 m land surface resolution, respectively.

An example of how we performed the experiments is when using 30 m atmospheric resolution applied to a 90 m land surface resolution. Here, we subdivide the surface

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cell into 30 m pieces by using nearest-neighbor resampling method in order to maintain the values of the 90 m land surface cells intact as shown in Fig 1. To clarify this point, we will provide a more elaborated paragraph to explain the interpolation process in both atmospheric and surface resolutions.

Regarding the referee's suggestion in which errors can even be correlated with both elevation and the atmospheric resolution, by calculating the distances for the higher resolution land surface cells to the center of the atmospheric cell, we will incorporate both correlation analyses to prove statistically that topography and atmospheric resolution matters.

On the model calibration comment, we agree Parflow has many more parameters that can be adjusted. However, a multiple parameter calibration for Parflow is still a computational challenge. The results should be seen as numerical experiments designed to assess scale issues in hydrologic modeling, and it is not intended to match observations to assess model performance with respect to observational data.

As the referee mentions, running a hydrological model for just one year seems really short and the outcomes could strongly depend on the conditions for that specific year. We agree with it, however longer simulations are computationally expensive, and we have chosen that year randomly among others with similar climatic conditions that match a dry initial condition at the end of summer followed by normal observed rain and snowfall in the study area and that also could allow us to analyze the hydrologic state variables chosen for these experiments. To clarify this part of the manuscript, we will consider the limitations of models and experiments in the discussion. Also, in an updated version of the manuscript, we will include streamflow simulated data to assess the atmospheric scale influences based on the mentioned variable.

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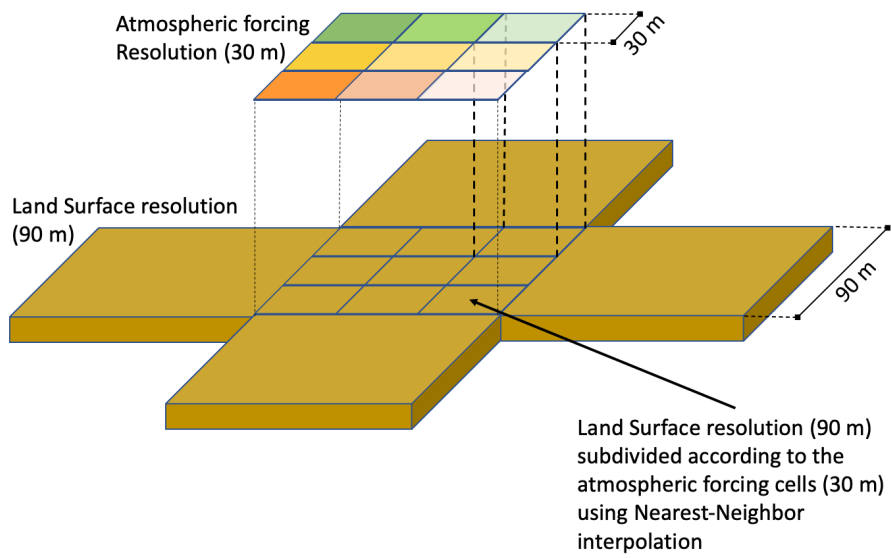


Fig. 1. Example of 30 m atmospheric resolution applied to a 90 m land surface resolution.