

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-212

Anonymous Referee #1

Referee comment on "Improved runoff simulations for a highly varying soil depth and complex terrain watershed in the Loess Plateau with the Community Land Model version 5" by Jiming Jin et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-212-RC1>, 2021

My main problem with this manuscript is that the authors have misrepresented CLM5 as having a constant soil depth of 8.03 m. This is not true. Variable soil thickness has been implemented into this newest version of the model (see the CLM Technical Note at https://escomp.github.io/ctsm-docs/versions/release-clm5.0/html/tech_note/index.html). With this implementation, the number of hydrologically active layers varies from grid cell to grid cell.

Therefore, what the authors are investigating here is not the addition of variable soil thickness but the impact of vertical resolution with variable soil thickness. They need to make this crystal clear in Section 5.1. Also, are the bottom of the "soil" columns all at the same depth in each of the SLN sensitivity tests? If so, the authors should state that. If not, the authors should note what the bottom depth in each test simulation is.

The goal of this work is to improve the runoff simulated in this region of interest, the Wuding River Basin. It is clear that the increase in vertical resolution improves the simulations, but the runoff is still biased. I am pleased to see the improvements made by adding the realistic river network and the changes made to improve the evapotranspiration.

Of minor note, at Line 134, the authors introduce the acronym WRB without earlier definition in the body of the text. They do define this in the abstract, but they need to define it in the body of the manuscript.

Finally, shouldn't the Nash-Sutcliffe efficiency be between 0 and 1 in magnitude?