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Interactive comment on "A subbasin-based framework to represent land surface processes in an Earth System Model" *by* H.-Y. Li et al.

Anonymous Referee #1

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This paper is correctly written, but the scientific content is of low interest, and I recommend to reject it.

The authors compare two versions of the Community Land Model (CLM) which share the exact same equations and parameters, the only difference being in the spatial discretization of the modeled domain (here the Columbia River basin). The standard CLM version uses a regular grid-mesh (at the 0.125° resolution), and the SCLM version (with an S for Subbasin-based) uses hydrological basins as elementary spatial units. Since these hydrological basins are defined in this paper to have an average area close to the one of a 0.125° grid-cell, these two versions produce very similar results, as anyone with a bit of geoscientific modeling experience would have expected.

Moreover, the largest differences (which remain weak from my point of view) are i) not

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explained nor discussed, ii) said to be "more significant" than the weakest differences, without any statistical inference test.

The technical aspects of forcing data processing for the subbasin discretization do not reveal any innovation compared to the state of the art. The indexing system could have been an interesting point, but it is just mentioned and not explained. A notoriously difficult input parameter for hydrological modeling is soil depth, and it is not even mentioned in section 3.2 "Land surface parameters".

A complementary part is about the influence of DEM resolution on fmax and runoff generation, but i) fmax is not even defined nor its link to topography, ii), we need to go the caption of Fig 10 to understand the nature of the sensitivity test, iii) the results are not explained nor linked to the abundant related bibliography.

Minor comments on the Figures:

Fig. 2: normally, in land surface models, it is air temperature and not surface temperature that is a forcing data.

Fig. 5: the colors are difficult to discriminate, and the caption is not informative.

Fig 7: Soil moisture is not a term of runoff, and this panel is not commented in the text.