

## ***Interactive comment on “On the sensitivity of meteorological forcing resolution on hydrologic metrics” by Fadji Z. Maina et al.***

### **Anonymous Referee #1**

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#### General comments

This paper tested the sensitivity of the spatial resolution of meteorological forcing data on hydrologic model results. The paper addresses a classic scientific question which is within the scope of HESS. The descriptions of experiments and calculations are complete. However, the idea and findings of this paper are not novel. Moreover, the conclusions are derived from one meteorology model and one hydrologic model, the results to me are insufficient to support the conclusions. Lastly, the paper is not well written and the presentation of results analysis is unclear.

#### Specific comments

1. Supportability of the findings. As mentioned above, the conclusions are derived

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from one meteorology model and one hydrologic model. These are not sufficient to provide a general conclusion. For example, the conclusion that “. . . the meteorological data should be at the resolution of the input data as well as the physics-based model to ensure a good precision and accuracy in the representativity of the snow dynamics.” (Lines 333-335) may not be applicable if modelers adopt hydrologic response units, not grid cells, to build hydrologic models. For irregular computational unit based hydrologic modeling, what is the appropriate input data resolution? I hope to see more experiments or discussions on it.

2. Moreover, the accuracy of the WRF meteorology model and the downscale and upscale techniques are very important to this paper’s results. The authors validated the quality of different resolution forcing data at the watershed lumped level and the distributed level in Appendix A. However, in Figure A.2 and Figure A.3, the meteorology at 40.5km look bad as the pattern becomes very blurry. I would encourage trying a finer resolution, such as 27km. In addition, is it possible to validate the WRF and downscaled meteorology with measured precipitation and temperature data for this research area? This will better valid your modelled and calculated meteorology forcing.

3. Title issue. It would be better to change “hydrologic metric” to something more appropriate. I suggest this because some hydrologists may understand “hydrologic metric” as hydrology model performance metrics, such as Nash–Sutcliffe efficiency (NSE) or Kling–Gupta efficiency. An alternative could be hydrologic prediction. Moreover, is the first word “on” redundant? Please correct me if I’m wrong.

4. Presentation of the results. The writing of this paper needs to be improved. I found it hard to understand some sentences, the definitions of several terms and the full name of an abbreviation are missing, and some citations and captions are not standardized. Please see below for details.

5. In section 2a, I suggest specifying the areas of the Sierra Nevada Mountains and the Central Valley in Figure 1.

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## Technical corrections

1. Line 268, “5 spatial resolutions”. Change 5 to five. Similarly, to line 271.
2. Equation 7 and Equation 8, are the two  $\varphi$  the same? I guess one is surface pressure head, and nother is subsurface pressure head. Please be consistent with the terms in Equation 1 and Equation 2, and be specific.
3. Line 341, citation (Rasmussen et al., 2011) should be Rasmussen et al. (2011).
4. Unclear sentences list. a. Lines 330-332 b. Lines 369-370 c. Lines 493-495 d. Lines 523-524 e. Lines 527-528 f. Lines 540-544 g. Lines 624-626 h. Lines 630-632
5. Incorrect caption citation list. a. Line 347, Equation 5 -> Equation 6. b. Line 686, figure xx. c. Line 687, 0.01 C.
6. Undefined abbreviation: Line 342, WY.
7. Unclear referent. a. Line 561, the latter. b. Line 590, the latter.
8. Line 666, Climate Models -> Climate models.

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