

Interactive comment on “TOPMELT 1.0: A topography-based distribution function approach to snowmelt simulation for hydrological modelling at basin scale” by Mattia Zaramella et al.

Anonymous Referee #3

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This manuscript presents enhanced a snowmelt model by combining temperature, clear sky potential solar radiation, and topographic parameters. This is very important in hydrologic model as there are few data available in the high mountains. However, this manuscript needs a significant improvement.

Major comments:

1. The structure could be improved. 1) in the Introduction, the manuscript should emphasize the gap and importance of the research and how you are going to achieve, instead of model introduction as in lines 21-35 (page 2) and lines 1-10 (page 3).2) Section 4 kind of mixes the methodology and model results

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2. The model calibration is too short. For new model introduction, people are interested in model parameters, their sensitivities, or how to estimate these parameters. It is not clear here.
3. Comparison results are also missing. For example, there is only one simulation presented in Figure 6, while there are so many simulations have been done (if I am right). How does snow parameters affect hydrograph or snow cover? (see also point 2 above).
4. I am not clear how radiation is calculated. Is it based on station data or theoretical solar radiation equation? How did MODIS data come into play? Section 2.1 and/or section 4.1 could explain something on this.
5. The integration of TOPMELT and ICHYMOD is also not clear, especially on the routing. My understanding is that ICHYMOD is a lumped model and its routing scheme shouldn't consider elevation bands. Then how is water from each cell (combination of elevation bands and radiation classes) routed to the outlet?
6. English is readable. However a native speaker might improve the manuscript
7. Section 5 seems more like a summary

Minor comments:

1. Line 24 of page 1 and Line 1 of page 2. I don't understand the logic
2. There is a duplication (line 29 of page 3, and line 1 of page 4)
3. Equation 1. What is the range of G
4. Figure 6: add the content of bottom plot in the caption.
5. Figure 7: why don't you use the whole simulation period?
6. "reference fields" in the second last line of Page 14: what are they?
7. Figure 8: What is your point? To me, models with similar spatial or temporal resolu-

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tion should give similar results.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2018-202>, 2018.

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