

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2021-319

Anonymous Referee #2

Referee comment on "Review article: Parameterizations of snow-related physical processes in land surface models" by Won Young Lee et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-319-RC2>, 2022

This article is a bibliographic study of several documented snow parameterizations of land surface models. It is the kind of work one would carry out as a preparatory work for developing a new land surface model. It is, unfortunately, not a proper review article up to the standards that should be help by an international journal. For this to be the case, the article would at least need to discuss the relationship between the different parameterizations and model results. This would also be needed, by the way, if this was only a preparatory work for the development of a new model by the authors.

As it stands, the article is a compendium a openly available and documented snow parameterizations in land surface models. It is not a scientific work in the sense that there are no tested hypotheses, for example: One could, for example, test the hypothesis whether some type of parameterizations (e.g. reflecting the effect of vegetation) is beneficial. Here, this assertion is based on the analysis of the documented parameterizations, and it is plausible, but the scientific approach needs to go beyond esablishing hypotheses - it also needs to test them, or at least, it has to acknowledge the difference between a hypothesis and a tested, confirmed (or at least not rejected) hypothesis that allows conclusions.

In the conclusions section, the authors pretend that each parameterizations's vulnerabilities have been identified. It is unclear how the authors come to that claim, and it is not substantiated in the lines that follow this claim. Rather, what follows is a summary of some basic characteristics of the different LSMs. Exactly what the reader should take home from this work is unclear at the end.

In summary, I do unfortunately think that this work cannot qualify as a review article in the Cryosphere. For a review to make sense, one has to learn more than what one could have learnt by digging into the documentations, even though it can be useful to have that juxtapositions of abbreviated documentations here.