

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2021-304

Anonymous Referee #2

Referee comment on "Novel coupled permafrost-forest model (LAVESI-CryoGrid v1.0) revealing the interplay between permafrost, vegetation, and climate across eastern Siberia" by Stefan Kruse et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-304-RC2>, 2021

Dear Editor/Authors

This manuscript describes a coupled model version amalgamating a one-dimensional permafrost-multilayer forest land-surface model (CryoGrid) with an individual-based and spatially explicit forest model (LAVESI). The authors' approach is extremely important for understanding the current environment of permafrost region and predicting the future, because changes in the permafrost environment due to climate change are closely related to changes in vegetation.

This study certainly has merit, though I've got some concerns list below. The main issue in my mind is structure of the methods section. It is unclear for me what new processes have been added or what parameterizations have been conducted in this study. It would be better if the authors organize them clearly and explicitly. For example, "gdbasalconst", "gdbasalfac" and "gdbasalfacq", estimated from tree-ring data, are parameters newly estimated in this study, so (I think) it should be included in Table 1, not Table B1.

If the authors could consider above and below specific comments, I believe that it would improve the readability of this manuscript.

Specific Comments:

P1L27 Should it be Eastern Siberia instead of Central Siberia?

P2L2 Should it be Eastern Siberia instead of Central Siberia?

P2L4-L5 I think the reader will understand better if the authors provide specific examples of the positive feedback.

P4L15 Which parameter in Table 1 could tell us the better low temperature tolerance of the tree species LACA?

P4L25 I think an explanation of gnls-function would help the reader understand it better.

P4L28-L29 "gdbasalconst", "gdbasalfac" and "gdbasalfacq" are now listed in Table B1, not in Table 1. But, I think they should be listed in Table 1 because they are newly estimated in this study.

P8L12-L14 Since the authors did not compare the simulation results with observed data (they are only comparing the simulation results from LAVESI and the coupled model), I don't think the term "overestimation" is appropriate.

P8L15 I don't really understand what the authors are trying to say. I think all we can know from Figure 3-4 is that the simulation results from LAVESI and the coupled model are different.

P8L26-L27 What are the factors that cause LAI values to decrease? Could the authors describe possible factors?

P9L11-L12 Reference are required.

P22 I don't see Sato et al., 2010 (in table 1) in the list of references; is that a mistake for Sato et al., 2016?