

Replies to Editor comments

Dear authors,

thank you for those revisions, which address well the concerns outlined by the reviewers. I have two final requests:

In Figure 1, please indicate the location of the 10m boreholes as requested by one referee. You can do this easily by using a differing symbol.

We have modified the figure and the figure caption accordingly.

You have added "spatially distributed in-situ data sets are required to calibrate and validate spatially distributed modeling schemes in heterogeneous permafrost landscapes.", referring to Gubler et al. 2013. Are you sure that you refer to the right paper (not the one of 2011)? The 2013 one reports on an extensive sensitivity study that shows how much uncertainty can be introduced when simulating heterogeneous environments. While the need for spatially distributed measurements is mentioned there, the main contribution of that paper is an entirely different one. And, in my mind, it is highly relevant for discussing uncertainty in this type of simulation. Even though this model does not have a coupled hydrology and explicit energy balance, many of the parameters w.r.t. e.g., found discretization will have similar effects. Again, as I am biased as a coauthor, feel free to ignore my comment if you believe this does not add to your work.

We agree with this comment, and have used Gubler et al., 2011, instead in the above paragraph. We have added a sentence referring to Gubler et al., 2013 earlier in the paragraph: "A sensitivity study for a transient thermal model similar to CryoGrid 2 in Siberia showed that the thermal properties of the snow cover are the critical source of uncertainty for successfully reproducing ground temperatures (Langer et al., 2013). A similar result was found in a sensitivity study with GEOtop (Endrizzi et al., 2014) for a site in the European Alps for which the assumed snow conditions crucially influenced the uncertainties of modeled ground temperatures (Gubler et al., 2013). Most likely, these findings are also applicable to this study and the representation of the snow cover (including snow water equivalent, density and thermal conductivity) should deserve increased attention in future modeling approaches."

We think that some of the results of the sensitivity study by Gubler et al., 2013, may not be directly transferrable to this study/CryoGrid 2. The model sensitivity towards discretization of the soil domain is an example, since it is, in our experience, strongly dependent on the applied time integration scheme, the employed time step, and finally the gradients occurring at the respective sites due to the applied driving data. The findings on the snow cover, however, are most likely transferrable, at least to the degree of the results of the already cited Langer et al., 2013-study.

Both my comments do not influence the validity of your results and I trust you will find a good way to deal with them. There will be no further review.

On behalf of all authors,

Sebastian Westermann