

Response to Editor and Reviewers

Both reviewers acknowledge the improvement of the manuscript after the revision and suggest “minor revision”.

I warmly recommend the author to carefully revise the whole manuscript, and, in particular, to consider the following suggestions, based on the reviewers’ comments.

Reply: Thank you very much for your constructive feedback and giving me the possibility for further clarifying some statements made in the manuscript and highlight the research questions addressed.

1) Improve the Introduction, especially the end of that section, to clarify what research questions are examined and how they are answered with the improved model.

Reply: Thank you very much for pointing out that the formulation of the research questions addressed needed further clarification. The Introduction was restructured and the research motivation and addressed questions are now clearly stated at the end of the Introduction.

2) Once the research question is posed in a clear way, a better description of the methods which are compared and how the comparison is conducted should be included quite easily in a subsection of Methods and/or Data sections. This is partly consistent with one of the comments by Referee #1 on the original version of the manuscript. Therefore, the comparison of the innovative modeling proposed here with previous or different approaches is not yet optimal. Also, Referee #2 recalls that a comparison with experimental or monitoring data is missing, but the comparison with the results of other models is nevertheless interesting.

Reply: The methods of comparison with field data and of the used LTE model for comparison have been included in the manuscript in three subsections in the Methods section. Please note that a comparison with experimental data, as suggested by reviewer #2 was added to the manuscript in the previous revision!

3) Referee #2 requires a sensitivity analysis with respect to ice density, because the use of different ice densities in the original and in the revised version seems to leave the results unchanged.

Reply: The requested density analysis has been added to the results section (Fig. 4). Please note that the perceived change in ice density was only due to a typo in the original manuscript (use of two different values in different sections of the manuscript). Hence, in the previous revision the typo was corrected without changing the simulations. As shown in the requested analysis, an increased ice density does influence the results but on a very minor level not visible in the provided temperature-depth profiles.