Geoscientific
Model Development
Discussions

Interactive comment on "Improving permafrost physics in the coupled Canadian Land Surface Scheme (v. 3.6.2) and Canadian Terrestrial Ecosystem Model (v. 2.1) (CLASS-CTEM)" by Joe R. Melton et al.

Anonymous Referee #2

Received and published: 29 May 2019

The manuscript presents an improved model version of the Canadian CLASS-CTEM model with respect to permafrost physics. The authors have done a great and extensive job dealing with the uncertainties of heat transfer within cold soils. Several tests were performed to see the optimised results and compared to observational datasets. The improved model version is a valuable formulation to be used in offline and coupled simulations. The analysis in the manuscript can also help identify other modelling groups for better physical formulations. The topic and the presentation fits the journal's scope, yet I have some minor suggestions to the authors to make the paper bit more

easy to read through:

1. The extent of statistical analysis is way too long in the manuscript. I strongly suggest to move some of them to supplementary materials to make the actual paper more on point and show the most optimal formulations inside the main manuscript.

2. I agree with the authors to focus on the big scale improvements rather than grid point based comparisons but to actually identify the process improvements, it would be useful to show two or three selected grid points and compare the surface ($\sim$10-20cm) soil temperature time series for different experiments in addition to the borehole temperature comparisons in fig11.

3. To better quantify the snow pack improvement process, it would also help to show comparisons of snow depth with the observed values (if it exists). Since snow insulation plays a major role in freeze/thaw periods, the simulated snow depth should be investigated.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2019-42, 2019.