

## ***Interactive comment on “Modeling the snow surface temperature with a one-layer energy balance snowmelt model” by J. You et al.***

**Anonymous Referee #2**

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### General comments

This study investigates a new parameterization of snow surface temperature in the UEB snowmelt model. The results compare and evaluate modeled and measured snow surface temperature, snow energy content, snow water equivalent, and snowmelt outflow by using three approaches: the equilibrium gradient approach, the force-restore approach, and a modified force-restore approach. The validation of the new parameterization has been tested against datasets from the USU Drainage Farm and CSSL snow laboratory in 1 year period. The results indicate that new approach allows a robust representation of the snowpack energy balance, even by using a simple one layer surface snow model.

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Overall the study is interesting and within the scope of the journal. It seems, however, that the scientific contribution of results in current form is only incremental. The significance of the contribution will be much higher, if the approach will be tested and statistically evaluated over a longer time period. In the current form, the results (figures) do not clearly demonstrate a significant improvement in snow model simulations (compared to original UEB). Also a demonstration of the transferability of the model to other location(s) is not very convincing, mainly because of using only a very short data. I would also suggest to consider revising the Results and Discussion sections, in order to streamline the story. A large part of the Results section describes only what is presented in the figures, with limiting explanations about what does it mean and how it is related to the main objective of the study. The discussion section should be also be more closely linked with the results of other studies (not only discussing the own results), in order to clearly indicate the added value of the findings (with respect to existing literature).

### Specific comments

- 1) What is the numerical stability of the new approach?
- 2) Please consider to unify the figures (i.e. by using the same layout - axes limits, labels, etc). It will be easier to compare the results of different plots for the same station.

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