

The manuscript “Optimization of Snow-Related Parameters in Noah Land Surface Model (v3.4.1) Using Micro-Genetic Algorithm (v1.7a)” by Lim et al. addresses an important problem of model tuning/optimization. However, the results are not very encouraging, it shows very small improvements. Moreover, the manuscript seriously lacks in its analysis/validation part. Authors should come up with more results/analysis to claim substantial improvements in their method. The following are the comments, which may improve the manuscript.

- 1) The improvements looks very small compare to the existing mean bias (table 4). The improvement ratio (equation 7), a metric used here gives an impression of big improvement, but in reality it is not so. For an example, improvement of RMSE from 6 to 5 will show about 16.5% improvements, but RMSE of 5 is still big. Statistically how significant are these improvements ? Pls put significance level.
- 2) I would be interested to see some more graphical representations of analysis, rather than many statistical number presented here. There are so many numbers/numerical values mentioned in the manuscript (particularly the results). It is very hard to recognise changes in the box plot (Figure 4), as the improvements are really minute.
- 3) Pls write what is shown in the y-axis in Figure 4
- 4) I found the validation part of the manuscript is very weak. Perhaps you need to do more simulations/analysis to establish that your optimization method works better that the default model.
- 5) In several previous studies it has been shown that improvement/incorporation of real physical processes, such as discrete treatment of snow layer, more realistic snow physics significantly improves simulation of snow (e..g. Niu et al., 2011; Saha et al., 2017). Does your optimization fares better than above ?
- 6) Apart from RMSE, authors may also show any improvements in the correlation skill
- 7) How the seasonal cycle of snow parameters looks like (model vs observations)? Do you see improvements there also ?
- 8) What are the effects of optimized model on skin and sub-surface temperature, soil moisture, surface energy balance etc ?
- 9) As mentioned in the beginning, the ultimate goal is to improve forecast of snow over SK, I believe all-grid point simulation (gridded) would be a better strategy to really demonstrate the usefulness of this method.

Niu, G.-Y., et al. (2011), The community Noah land surface model with multiparameterization options (Noah-MP): 1. Model description and evaluation with local-scale measurements, *J. Geophys. Res.*, 116, D12109, doi:[10.1029/2010JD015139](https://doi.org/10.1029/2010JD015139).

Saha, S. K., K. Sujith, S. Pokhrel, H. S. Chaudhari, and A. Hazra (2017), Effects of multilayer snow scheme on the simulation of snow: Offline Noah and coupled with NCEP CFSv2, *Journal of Advances in Modeling Earth Systems*, 9, 271-290, doi:10.1002/2016MS000845.