

# ***Interactive comment on “Assessing the simulated soil thermal regime from Noah-MPLSM v1.1 for near-surface permafrost modeling on the Qinghai-Tibet Plateau” by Xiangfei Li et al.***

## **Anonymous Referee #1**

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The authors systematically evaluated the effects of different physical processes and associated parameterization options on Noah-MP simulated soil temperature at a permafrost site over the Tibetan Plateau. The manuscript is generally well-written and well-structured. Before it can be considered for potential publication, I have a few comments for the authors to consider.

### Major comment:

1. I am not convinced why the authors did not test the snow-related processes and parameterizations, such as snow albedo and rain-snow partitioning schemes. These processes along with the snow cover formulation in Noah-MP will affect sur-

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face heat fluxes and energy balance, which can potentially affect soil temperature evolution below snowpack. Particularly, the authors found that Noah-MP generally underestimates the soil temperature during the cold season, which could partially be related to snowpack simulations. The authors also did not tell the readers that what parameterization schemes they used for snow albedo and partitioning processes. Moreover, a recent study over Tibetan Plateau (Jiang et al., 2020, <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2020JD032674>) showed that the processes already tested by the authors here along with the snow cover formulation can significantly affect snowpack simulations, which could further affect soil conditions. Thus, it is likely that the processes the authors tested can indirectly affect soil conditions through modifying snowpack. I suggest the authors add some discussions on this aspect and include some quick tests for snow-related processes if possible.

Minor comments:

1. Line 108: “depth” -> “depths”.
2. Line 170: Please give some details on how the soil column was discretized, e.g., how many soil layers, the thickness of each layer, etc.
3. Line 189: What is “Si”?
4. What is the model timestep in the simulations in this study?
5. Section 4.3: The authors only tested the model performance at one site. So to what extent their conclusions can be extended to other Tibetan Plateau areas?

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