This study makes use of the satellite remote sensing and the weather reanalysis data to produce land surface temperatures (LST), which is an important component for modeling the permafrost thermal state, and correspondingly the permafrost extent. This work addresses how LST could be used by the semi-empirical simple permafrost model to calculate present permafrost extent and, more importantly, ground temperatures. I have several suggestions and comments that could be used to improve the current manuscript. I also have several questions. Overall, I enjoyed reading the manuscript and will suggest for the publication after revision.

In the Introduction section, I suggest to mention similar studies by Panda et al, (2014) and Luo et al, (2014). In previous studies, researchers used the GIPL1 model. It will be useful to mention how the GIPL1 is different from GryoGrid1.

Section 2.4. It is not clear why authors used ERA-Interim and not MERRA-Land or CRUNCEP or any other reanalysis dataset.

Section 2.5. Authors mentioned the importance of snow and used snow fall (SF) parameter in Table 1 as a turning coefficient for the input parameters. It is not clear, what are the units for SF? Is it normalized or non-dimensional?

It looks to me that SF is the major coefficient affecting the range in SD shown on Figure 2. If so, then some areas in the mountains could accumulate a lot of snow. Does that mean that we should expect higher uncertainty in certain regions? Adding more background on where we should expect high/low uncertainties in SD will be useful.

Authors mentioned that input parameters in Table 1 are drawn from previous studies. I suggest expanding this by adding more background information on how and why the ranges for n_t and r_k have been selected. How are the ranges from Table 1 applicable to other geographic regions?

P758. L24. More background is needed on how the cloudy scenes were identified (manually or by using some sort of algorithm)?

P 762. L 5. Why is n_t assumed to be equal to 1?

Figure 2. Typically TSP temperatures are measured at depth of 20 m. The TTOP calculates temperatures at the top of the permafrost table. It is not clear how did authors compared those two temperatures? If temperatures calculated by GryoGrid1 get extrapolated to the deeper depth then that has to be mentioned in the manuscript.

In the conclusion section, I suggest to add a paragraph describing how this regional study can be carried over globally? What researchers need to know when use GryoGrid1 in Mongolia or Russia?

Adding one more figure with calculated uncertainties (SD corresponding to Figure 4) will be extremely useful as well as describing the uncertainty map.

References

Panda SK, Marchenko SS, Romanovsky VE. 2014. High-resolution permafrost modeling in Denali National Park and Preserve. :1-46.Natural Resource Technical Report NPS/CAKN/NRTR-2014/858. National Park Service, Fort Collins, Colorado.
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Luo D L, Jin H J, Marchenko S, Romanovsky V. 2014. Distribution and changes of active layer thickness (ALT) and soil temperature (TTOP) in the source area of the Yellow River using the GIPL model Science China Earth Science, 09/2014; 57(8):1834–1845. DOI: 10.1007/s11430-014-4852-1