

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on **essd-2021-429**

Anonymous Referee #1

Referee comment on "Permafrost, active layer, and meteorological data (2010–2020) at the Mahan Mountain relict permafrost site of northeastern Qinghai–Tibet Plateau" by Tonghua Wu et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-429-RC1>, 2021

General comments

The paper by Wu et al., presents 11 years of meteorological and soil data in a relict permafrost site of the Mahan Mountain on the northeast of the QTP. The paper is generally well organized and clear to me. As a permafrost researcher, I appreciate the considerable efforts taken by the authors to the permafrost community. I also very much welcome the publication of valuable permafrost datasets.

Major comment

- **GST vs LSM:** *"The ground surface temperature (GST) was measured by the IRP-P at a height of 2 m above the ground surface through non-contact infrared radiation"* (P10, L167–168). In this context, the measured value is the radiative skin temperature of the land surface. The surface could be snow, grass, and a mixture of them, right? I would keep the "GST" for soil temperature and "LSM" for ground skin temperature. I hence suggest changing the GST to LSM throughout the manuscript.
- **Permafrost and Active Layer:** Based on the authors' title—*"Permafrost, active layer and meteorological data (2010–2020) from a relict permafrost site at Mahan Mountain"*, I would expect the detailed info of permafrost & active layer would be present. However, the paper in its current format is somehow unfocused, and the permafrost/active layer is very lightly discussed and seems equal or even less important than the meteorological data. Hence, I suggest enhancing the statistics of permafrost and active layer conditions and changes during 2010–2020. Since authors have a 11-years' time-series, this could be easily done by

- adding permafrost temperature profile (MAGT) in different years info into Figure 7, so that readers could see permafrost temperature changes;
- presenting active layer thickness (conditions and changes) based on soil temperature;
- discussing why permafrost could be relict here. This is the most unique feature for this site. The permafrost temperature is very very close to 0°C (i.e., around -0.1°C, and only slightly increased. With the presence of massive ground ice at this site, air temperature warming would mostly lead to significant phase change rather than temperature increase. Also, the thick peat layer and cloudy/foggy weather in summer are favorable for the presence of permafrost.

3. **Language:** The English need to be carefully checked and revised by native speakers.

Specific comments

- P2, L39: The permafrost extent is from Zhang et al., (2000), right? If so, I would only cite the related reference and remove the others here.
- P3, L44: There are "*increasing*"...
- P4, L98: This is a repeat of L83.
- P5, L111: Relict permafrost will not disappear in the next 40–50 years, this means it is not sensitive to climate warming...
- P10, L166: *was ranging* □ *ranged*.
- P14, L269--271: Please remove the missing data info in the figure caption as this has already shown well in the Figure. In such a case, the sentence could be much short, i.e. *The blank gap stands for the missing data.*
- P18, L350: In general, it is difficult to distinguish the permafrost model and LSM, it largely depends on the research purpose.
- Permafrost models, i.e., CryoGRID 3 model (Westermann et al., 2016) has the land surface processes (snow, energy bucket), and permafrost physics have also been implemented into the land surface models, i.e., CLM5, Noah, CLASSIC. What about changing to "*...valid models...*"?

Tables & Figures

- Table 1: The operation period is the same for all measured variables, right? In this case, I would suggest removing the column and putting the temporal coverage info in the table caption.
- Figure 3: Please somehow change the y-axis range of relative humidity (g). A maximum value of 120 is not reasonable here (as you mentioned in L208). A tricky would be to give the y-axis range a little bit greater than 100%, but only show the value labels between 0–100.
- Figure 6
- Should the unit of y-axis be "*cm*"?

References

Zhang, T., Heginbottom, J. A., Barry, R. G., and Brown, J.: Further Statistics on the Distribution of Permafrost and Ground Ice in the Northern Hemisphere, *Polar Geogr.*, 24, 14–19,

Westermann, S., Langer, M., Boike, J., Heikenfeld, M., Peter, M., Eitzelmüller, B., and Krinner, G.: Simulating the thermal regime and thaw processes of ice-rich permafrost ground with the land-surface model CryoGrid 3, *Geosci. Model Dev.*, 9, 523–546, <https://doi.org/10.5194/gmd-9-523-2016>, 2016.