

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on **essd-2022-68**

Anonymous Referee #1

Referee comment on "Microwave radiometry experiment for snow in Altay, China: time series of in situ data for electromagnetic and physical features of snowpack" by Liyun Dai et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-68-RC1>, 2022

This manuscript introduces a dataset collected from an Integrated Microwave Radiometry Campaign for snow (IMCS) conducted at the Altay National Reference Meteorological station (ANRMS) in Xinjiang, China. The dataset could be very useful for the evaluation and development of microwave and optical radiative transfer models and snow evolution process models.

The topic of the study is interesting and well fits the scope of the journal, especially for this special issue. The manuscript is well written, logically organized, and the details of field campaign are easy to follow. The data processing is careful and well documented. However, there are still some concerns that need to be addressed. Thus, I am supportive of the publication after a minor revision to further improve the quality or make it more clear for the readers to understand the results. Below are my suggestions:

General comments

- Title: change "in situ time series of data" to "time series of in situ data"; delete "and environment".
- L59-L89: It's suggested to provide a table to summarize the main characteristics of those mentioned experiments and the experiment presented in this paper.
- L115-116: Did the author measure the surface heat flux, e.g. sensible and latent heat flux?
- Figure 1: the pictures in the blue, red and pink boxes are too small to identify the exact instrument. Maybe the authors can divide this figure to two figures.
- L151: It's suggested to merge Section 2.2 and 2.3, and the presentation can be grouped by the measurement parameters, e.g. microwave radiometry, snow pit...
- L183-198: what's the calibration accuracy for the microwave radiometry? Incidence angle of the radiometry measurement should be provided. It seems too large for the sky temperatures at L-band which is generally around ~5K.

- Figures 6/8/9: These figures can be improved, it's difficult to distinguish the lines.
- Figure 10: This figure can be divided into two figures for the soil moisture and temperature, respectively.
- Figure 11: I suggest this figure can be divided into two figures. Specifically, Figure 11a can be divided into two figures for the H- and V- polarizations, respectively. Figure 11b can be another figure, and the whole study period can be divided into several periods for the H- and V- polarizations, respectively. For example, it can be freezing, thawing periods, and it's suggested to include the snow, soil moisture and temperature measurements to show the link between these measurements with the diurnal variations of brightness temperature. Besides, what can be the reason cause the large variations found around 2016/2/25 and 2016/3/23?
- Figure 12: It's also suggested to compare the in situ measurements with the SMAP satellite measurements for the 1.4 GHz.
- Figure 13: it's difficult to distinguish the lines. Maybe you can put the shortwave radiation in one figure (e.g. 13a), and the longwave radiation in the other figure (e.g. 13b). Also, it's suggested to include the snow measurements to show the impact of snow on these measurements.
- Figure A1: the figure is too small, maybe you can increase the row to cover the full page. Also, some characters are difficult to understand (it seems to be Chinese).
- Table A2: the figure is too small.
- There were other microwave radiometry experiments conducted in the Third Pole, and the authors are suggested to include it in the Introduction part. Please find below several references for the details.

Zheng, D., Li, X., Wen, J., Hofste, J.G., van der Velde, R., Wang, X., Wang, Z., Bai, X., Schwank, M., and Su, Z. (2022). Active and Passive Microwave Signatures of Diurnal Soil Freeze-Thaw Transitions on the Tibetan Plateau. *IEEE Transactions on Geoscience and Remote Sensing*, 60, doi: 10.1109/TGRS.2021.3092411.

Zheng, D., Li, X., Zhao, T., Wen, J., van der Velde, R., Schwank, M., Wang, X., Wang, Z., and Su, Z. (2021). Impact of Soil Permittivity and Temperature Profile on L-Band Microwave Emission of Frozen Soil. *IEEE Transactions on Geoscience and Remote Sensing*, 59(5), 4080-4093.

Zhang, P., Zheng, D.*, van der Velde, R., Wen, J., Zeng, Y., Wang, X., Wang, Z., Chen, J., and Su, Z.* (2021). Status of the Tibetan Plateau observatory (Tibet-Obs) and a 10-year (2009–2019) surface soil moisture dataset. *Earth Syst. Sci. Data*, 13, 3075–3102.

Zheng, D., Li, X., Wang, X., Wang, Z., Wen, J., van der Velde, R., Schwank, M., and Su, Z. (2019). Sampling depth of L-band radiometer measurements of soil moisture and freeze-thaw dynamics on the Tibetan Plateau. *Remote Sensing of Environment*, 226, 16-25.

- Grammar check:

L33: change "sow" to "snow"

L40: delete "and optical"; delete "evolution"

Comments on the Dataset

L41: the link to the dataset cannot be open, please provide the detailed download link.