Response to editor

Thank you for your suggestions. We have thoroughly revised the manuscript by addressing your suggestions. The review comments are listed below and marked in blue, followed by the responses marked in black. The statements added in the revised manuscript were marked in red and italic.

Kind regards,

Xiaobo He

(on behalf of the co-authors)

Thank you for adding these revisions, however, I'm a bit confused by your clarification about the soil temperature and moisture data. It seems to me highly unlikely that the mean temperature for all these sensors would be so close to the air temperature in the summer, since the temperature at the lower depths should be much lower (even below zero for the deepest sensors?). To me, the soil temperature (and moisture) look realistic for the top sensor (5 cm depth), but not as a mean of all sensors. Could you please double check with your data that this statement is indeed correct and/or provide an explanation to how the mean value of these sensors can exhibit this variation over the year?

The easiest way, in my opinion, would be to include the data from all depths in the data file (figshare).

There is also a typo in the y-axis label for the soil moisture (going from 0 to 0.6 percent) in figure 2. I assume that the scale should go from 0 to 60 percent.

Lastly, to further improve figure 2, please clarify if the data is daily, which will also help readers to interpret the precipitation data, which reaches up 20 mm, which is a high precipitation intensity for one day.

Response: Thank you for the suggestions and sorry for the error in the y-axis label for the soil moisture in Figure 2. We have double-checked the soil temperature data and confirmed that they are correct. There are several reasons why the average soil temperature for all sensors was close to the air temperature in warm season：(1) with the thickening of permafrost active layer in recent years, the soil temperature in the bottom (300 cm) can be greater than 0℃ in warm season. (2) By analyzing the hourly variation of air and soil temperature, we found that the surface temperature (5-20 cm) in the daytime was higher than the air temperature (see Figure 1), which because the soil absorbs more solar radiation than the air during the daytime. But the air temperature at night was lower than that of soil due to permafrost layer has the function of heat preservation. Thus, the average soil temperature for all sensors was close to the air temperature in warm season. Moreover, the comparison with other sites we observed also shows these similar findings.

Based on the above analysis, we believe that the soil temperature data is correct. Meanwhile, we have updated and uploaded the soil moisture and temperature data for each measured soil layer in figshare (https://figshare.com/articles/dataset/tc-2022-17datasetV2_xlsx/21500229).

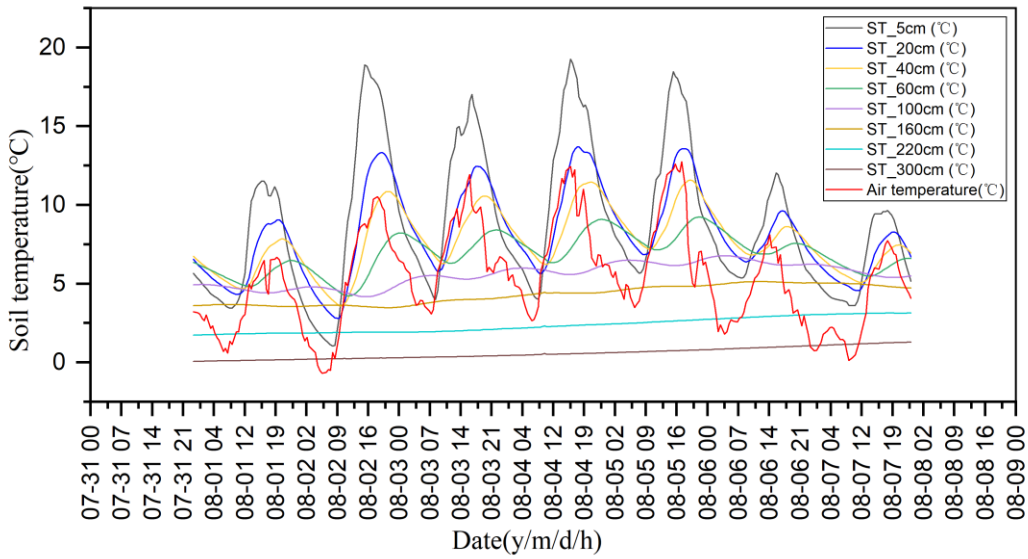

Figure 1. Hourly variation of soil temperature at different depths, taking the data from August 1 to August 7, 2017 as an example.(Not showed in the manuscript)

We have clarified that the data in Figure 2 is daily data. Figure 2 has been modified in the revised manuscript.

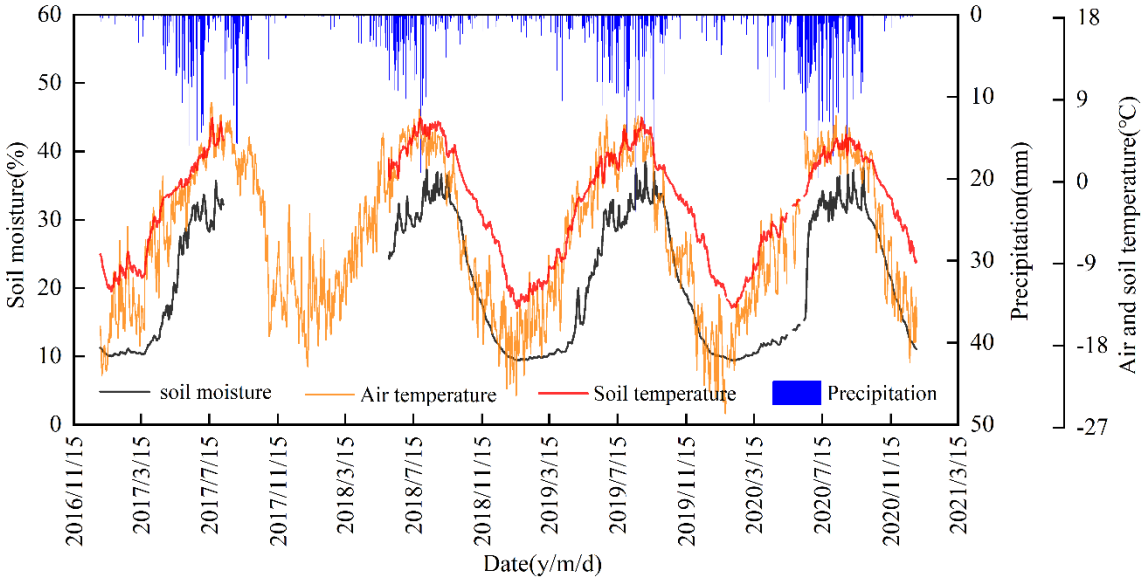

Figure 2. Daily variation of soil moisture, soil temperature, air temperature, and precipitation from 2017 to 2020. The soil moisture and temperature data were the daily average value of all the sensor data in the soil layer.