Revisions and responds to reviewer 2's comments

I appreciate the opportunity to review your manuscript. I think it will make a good contribution to the discipline. Overall, I think the authors present a well-structured study on the impact of thermokarst lakes on permafrost structure in the Qinghai–Tibet Plateau. The combination of geophysical prospecting methods (ERT, TEM) with temperature measurements is a robust approach to investigate sublake talik formation. The manuscript is generally well-written and organized, making it easy to follow the authors' line of reasoning. The topic is relevant, particularly given the context of climate warming and permafrost degradation, and the study appears to be the first of its kind in this specific region. I recommend publication after minor revisions.

Response: We thank Reviewer 2's positive and encouraging comments which helped us to improve this article considerably. It is our great honor to receive your recommendation. Following are point by point responses to his/her comments. The Reviewer's comments are written in italics and blue and our responses are presented in normal fonts.

Specific Comments:

1. Line 37: The authors state that permafrost degradation is the main driver. However, it should be acknowledged that other factors, such as precipitation and temperature, also play significant roles. Please revise the sentence to reflect this.

Response: Thanks for your comment. We have revised this sentence to "The surface area and number of thermokarst lakes caused by factors such as permafrost degradation, precipitation, and temperature in the QTP have been increasing (Luo et al., 2022)".

2. Line 80: The use of "spatial distribution" is too broad. The study focuses on the vertical distribution of permafrost. For accuracy, I recommend changing it to "vertical distribution" or "depth distribution."

Response: Thanks for your suggestion. We investigated the 2D permafrost structure in 3 transects. Therefore, we used the term "spatial distribution" and declared it.

3. Line 95: The abbreviation "TDS" is used without prior definition. Please introduce "TDS" (Total Dissolved Solids) at its first occurrence.

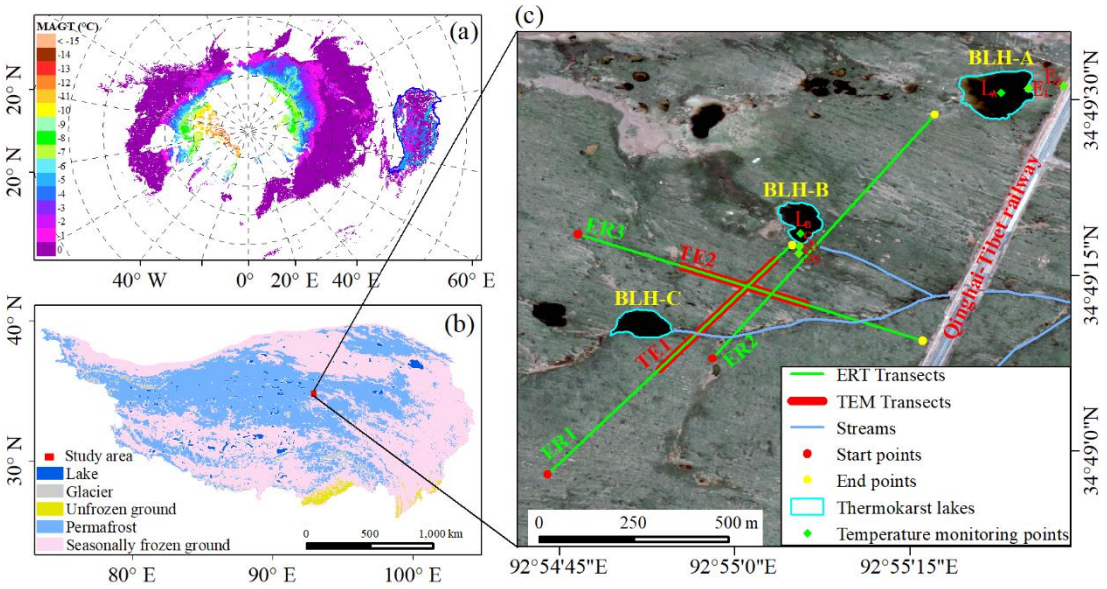
Response: Done and thanks! We have revised this sentence to "Lakes BLH–A, B, and C are freshwater lakes with pH and total dissolved solids of 8.22–9.71 and 208–952 mg/L, respectively".

4. Line 140: The figure reference should be corrected to read "Figs. 4c and 1d. "

Response: Thanks for noticing, we have changed it.

5. Line 189: The streams mentioned to the ERT transect ER1 are not marked in Figure 1. Please add the streams to Figure 1 for clarity. Additionally, consider removing or justifying the inclusion of lakes that are not directly relevant to the study to avoid clutter in Figure 1.

Response: Thanks for your good suggestion. Following the Reviewer's comments, we removed the irrelevant thermokarst lakes and added streams in Figure 1.



6. Line 295: The anomaly in ground temperature at a depth of 10-36 m in Figure 9a requires further explanation. Please provide a possible reason for this anomaly. It is critical to address this to give readers confidence in the data's veracity.

Response: Thanks for your comments. This abnormality may be caused by improper installation of the thermistor or improper handling during drilling and sealing. Although there are local anomalies in the ground temperature data, it can reflect the thermal state below the lake BLH – A and the changes in ground temperature at depth.

7. Line 297: The text mentions the application value of ground temperature monitoring in cold regions and suggests using the data in Figure 9 to estimate the lower limit of permafrost.

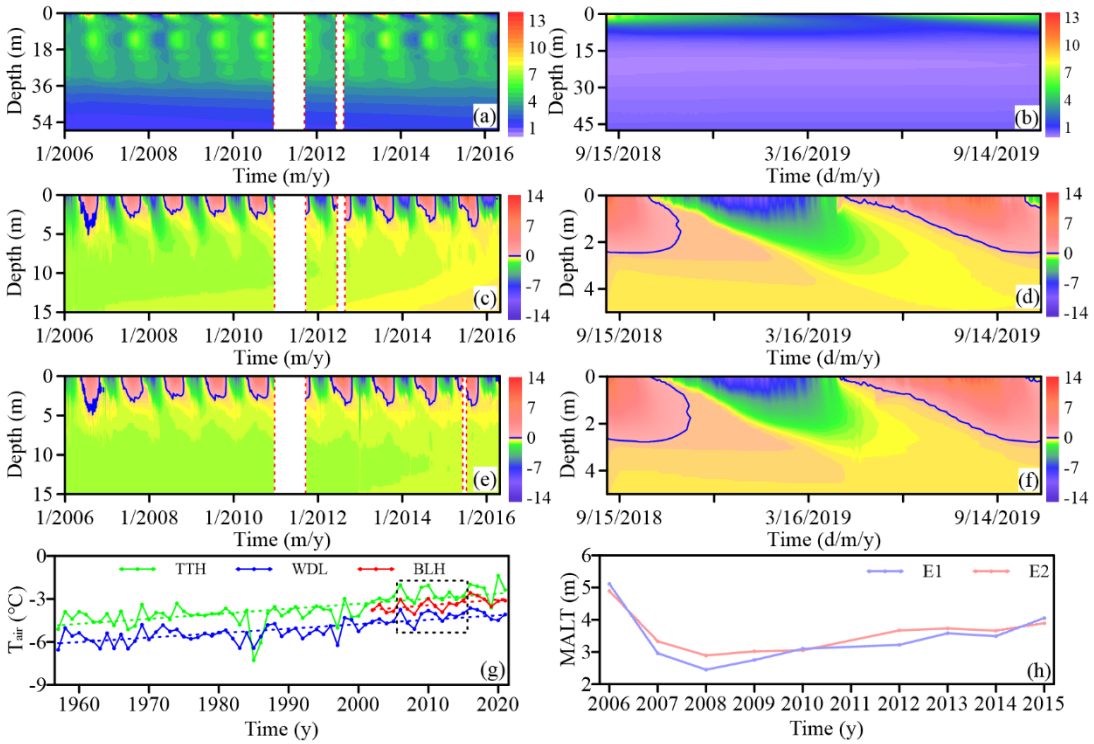
Elaborate on how the temperature gradient can be used for this estimation. This would add value to the discussion.

Response: Thanks for your comments. Ground temperature monitoring is the most effective method to determine the state of permafrost. In the supplementary information, we have added the calculation of the thawing depth (reach 73.38-87.21 m) below the lake BLH–A using the ground temperature gradient. The corresponding text (To determine whether there was a through-talik below lake BLH–A, the thawing depth (depths of 0℃) below lake BLH–A was estimated by using the geothermal gradient. The results showed the thawing depth was 73.38-87.21 m (Table. S3). With the depth increased, the geothermal gradient decreased. Therefore, the thawing depth may be greater than 87.21 m. The lower limit depth of the permafrost estimated by the borehole temperature was 85 m (Lin et al., 2010). Similarly, a previous study also found that temperature observation data could well record the process of permafrost from its presence to its complete disappearance (Lin et al., 2016), suggesting that a through-talik had also formed below lake BLH–A (formed 800 years ago determined by the ^{210}Pb and $^{137}C_s$) have also been added in the manuscript.

Selected depth (m)	*Temperature at the selected depth (℃)*	*Ground temperature gradient (℃ m^{-1})*	*Permafrost lower boundary depth (m)*
31.4	*4.16*	*-0.095*	*73.38*
41.4	*3.05*	*-0.084*	*77.67*
51.4	*2.05*	*-0.057*	*87.21*

8. Figure 9h: The vertical axis of Figure 9h should be reversed to maintain consistency and ease of interpretation.

Response: Thanks for your comment. We have reversed the vertical axis of Figure 9h.



9. Abbreviations: A list of acronyms used throughout the manuscript should be included at the end of the paper to improve readability.

Response: We thank the Reviewer for the good suggestion, which can help improve the readability of the article. We have added an appendix A. Nomenclature list at the end of the paper.

10. Line 23 in SI: The unit for hydraulic conductivity should be corrected from "(y/m/d)" to "(m/d)".

Response: Thanks for noticing, we have changed it.

11. Line 29 in SI: The temporal series data should include the appropriate unit (e.g., temperature in °C).

Response: Done, thanks for noticing!