Comment:

I believe the author has done an excellent job, but I think it would be preferable to compare such predictions with permafrost mapping or field survey results from the observed time period.

Response:

Dear Dr. Li:

Thank you very much for your constructive suggestion. We fully agree that comparing our simulation results with existing permafrost maps and field-based evidence is essential for strengthening the reliability of model outputs. In response to your comment, we have added a comprehensive comparison between our simulated permafrost distribution during 2001–2020 and two recently published Northern Hemisphere permafrost maps (Ran et al., 2022; Obu et al., 2019). The newly added content is presented in the revised manuscript (Lines 343–364) and the comparison is illustrated in the newly added Figure 5. Revision as below:

L343-364:

In addition, we compared the permafrost distribution simulated by the MLP model in this study during 2001–2020 with the recently published Northern Hemisphere permafrost maps (as shown in Fig. 5). Across the three permafrost maps, we observed a consistent representation of the widespread permafrost distribution in the Da Xing'anling Mountains, with the SLLP located approximately in the Arxan mountains. However, notable discrepancies occur among studies for the permafrost distribution in the Xiao Xing'anling Mountains, the Hulunbuir Plateau, and the southern mountainous regions (Huanggangliang Mountains and Changbai Mountains). For the Xiao Xing'anling region, our results are more consistent with those of Ran et al. (2022), but differ significantly from Obu et al. (2019). According to Huang et al. (2025), the SLLP in the Xiao Xing'anling mountains is located approximately between Heihe and Bei'an, which agrees well with our simulation. For the Hulunbuir Plateau, our estimation lies between the results of Ran et al. (2022) and Obu et al. (2019). However, due to the limited availability of field observations in this area, further verification is required. Regarding SLLP characteristics, the simulated permafrost distribution near the southern boundary in this study appears more scattered, reflecting the presence of isolated permafrost patches near the SLLP. This pattern is consistent with the actual conditions. With respect to the permafrost in the southern mountainous regions of Northeast China, our results and those of Ran et al. (2022) and Obu et al. (2019) all indicate the presence of permafrost. However, Obu et al. suggest a more extensive permafrost area in the Huanggangliang mountains, whereas both our study and Ran et al. (2022) show a more sporadic distribution. Based on the synthesis by Jin et al. (2025) and field surveys, permafrost in the southern mountainous regions of Northeast China may indeed exist but is difficult to detect; its occurrence is likely controlled by local factors. These findings further support the results of this study.
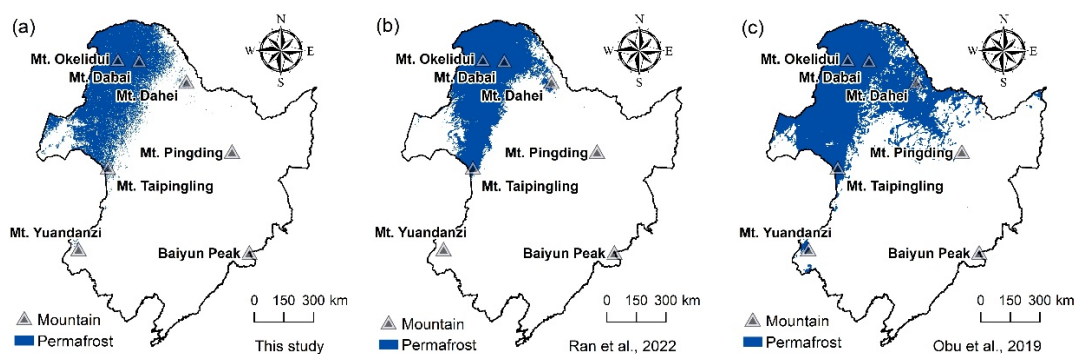
Figure 5. Comparison of the permafrost zone between the results of this study, Ran et al., 2022 and Obu et al., 2019. Notes: (a) result of this paper based on multilayer perceptron (MLP) model during 2001-2020, (b) result of Ran et al., 2022 during 2000-2016 and (c) result of Obu et al., 2019 during 2000-2016.