

General comments

This paper presents an integrated dataset on the permafrost along the China Russia crude oil pipeline in northeast China, which is an important complement to the current global permafrost database. These data are of great significance to the stability of linear infrastructures (e.g., pipeline, highway, railway), the validation of numerical simulation models, as well as the prediction of permafrost evolution process (degradation or aggradation). However, the manuscript still needs some revisions to reach a publishable level. My detailed comments as well as some suggestions are listed as below. Hope these comments will be useful to the authors to improve the manuscript.

Response:

Thank you very much for your comments. We have made a thorough revision to the original manuscript based on your comments and suggestions.

Detailed comments

Line 35: It should be better to say “the Earth’s cryosphere”.

Line 35-36, rewrite, “the thermal state” of permafrost” is not a component of cryosphere

Line 67: State Key Laboratory of Frozen Soil Engineering (SKLFSE), not soils. Check

Line 69: Delete the definite article “the” before electrical resistivity tomography (ERT).

Line 76: You can delete the comma before “in Northeast China”, or keep the comma, but delete “in” before Northeast China.

Line 82: “..... were established”

Line 84: “..... was primarily based on”

Line 90: Delete “climate wetting at”.

Line 108: “..... was installed”

Response:

Thanks for the suggestions, these sentences have been revised and highlighted in red in the revised manuscript.

Line 110-111: The sentence in the parenthesis is confusing. Do you mean the borehole was drilled 6 months before the installation of AWS? If so, you can just give the exact date when the borehole was drilled to avoid any confusion.

Response:

We are sorry for this unclear statement. The sentence has been revised as “Besides, a new borehole (JB-B-I) was drilled in March 2017 down to 60.6 m near the above-mentioned AWS.” according to your comments.

Line 116: Do you mean “wireless data transmission”? This also appears in line 157. Check!

Response:

It was changed as “Using such technology, it would be possible to check collected data in

real-time and identify possible sensor failures.”.

Line 145: “..... other profiles were done using”

Line 147: “..... least-squares method was employed for”

Line 181: “..... protected by steel tube”

Line 187: Be careful to use “would be” herein, you can just say “..... which was mainly related to the local topography”

Line 193: Should say intra-permafrost groundwater.

Response:

Thanks for the comments, the above sentences have been revised and highlighted in red in the revised manuscript.

Figure 3. I noticed that there are “zero curtain” phenomena in the left panel (a1-a4) of Fig. 3, but the duration time of zero curtain of each curve is not the same. The authors should explain the possible reasons for this (I suppose this is mainly related to the in situ soil water/ice content of the permafrost sites).

Response:

The reason for different durations of zero curtain was added and highlighted in red in the revised manuscript.

Figure 6: To facilitate comparison, I suggest using the same range of values in the vertical axis (GT) for each subfigure. (Same for the left and right panels in Fig. 3)

Response:

We re-draw the Figure 6 according to your suggestion.

Line 228-229: This deepening of the permafrost table and warming of permafrost has exposed the pipelines to thawed low-bearing foundation soils. This sentence has two subjects, so you should use have instead of has.

Line 230: the CRCOP-I had locally settled down

Line 233: In the parenthesis, you can refer to the literature Zhang, T. (2011) when explaining “talik”.

Zhang, T., 2011. Talik. In: Singh, V.P., Singh, P., Haritashya, U.K. (eds) Encyclopedia of Snow, Ice and Glaciers. Encyclopedia of Earth Sciences Series. Springer, Dordrecht. https://doi.org/10.1007/978-90-481-2642-2_563

Response:

The above sentences have been revised and relevant references have been added in the revised manuscript according to your comments.

Line 234-236: Why you used 300 ohm·m here? In my knowledge, this value can vary greatly from place to place around the world. The authors should give a criterion or any references to support

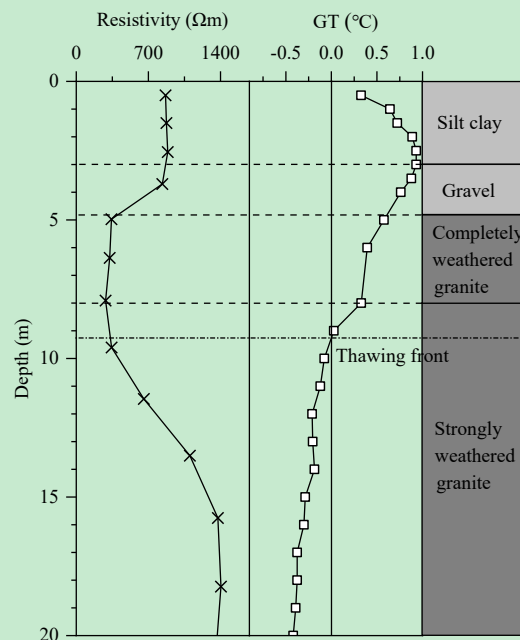
their choice (e.g., Schön, J. H., 1996; Christof Kneisel et al., 2008). Also, you said “boundary”, it is a little bit confusing. I understand you mean the boundary between unfrozen and frozen zones. So, my suggested wording is: electrical resistivity value of 300 ohm·m was used as the critical value to identify the boundary between frozen and unfrozen zones.

Schön, J. H. (1996). Physical properties of rocks. Handbook of geophysical exploration. Pergamon Press.

Christof Kneisel, Christian Hauck, Richard Fortier, & Brian Moorman, 2008. Advances in Geophysical Methods for Permafrost Investigations, Permafrost and Periglacial Processes, 19: 157–178, DOI: 10.1002/ppp.616

Response:

What you said is right. We selected a threshold value of electrical resistivity for discriminating between frozen and unfrozen zones according to the relationship among the resistivity, ground temperature, and lithology, as shown below in Figure. The related description has been revised according to your comment.



Line 254: Lower rate, not slower rate.

Line 256: Delete “the” before “cooling rate”.

Line 257-258: “abnormal changes in 0 °C isotherm observed in Figures 9b, 9c, and 9d” Here, the using of “observed” is strange to me. Figures can never observe anything by itself. So, just say “showed in figures 9b, 9c”

Line 259: intra-permafrost groundwater.

Figure 10: Should give the unit for VWC, m3/m3 or %.

Line 287: The MAGT at 15 m depth.....

Line 289: I suggest using “occurred” rather than “observed”.

Line 292: the ERT results

Response:

We have checked and revised the above English writing problems in manuscript according to your above comments.

