

Dear Reviewer,

We are grateful for the thoughtful and constructive feedback on our manuscript. Below, we provide point-by-point responses to each of the comments and describe how they have been addressed in the revised manuscript.

The provided comments helped us improve the clarity, framing, and focus of the manuscript. We believe the revised version better communicates the intended use, contributions, and limitations of the dataset and associated analyses.

To help distinguish between the comments and our responses, *the comments are shown in black*, and our responses are shown in **Orange**.

**General comment:**

*“The paper presented a repository of thaw settlement test results sourced from the literature (generally sourced from Canada). The paper used the data in the literature to compare the effectiveness of existing empirical tools for estimating thaw strain and to identify the most fitting tools for various soil groups.”*

**Comment 1:**

*“Although the tool presented in the paper will be useful for preliminary assessments, I'd like to point out that there is still a need for site specific data. If we don't understand the underlying foundation conditions for the transportation infrastructure (i.e. example given in the paper), the estimates resulting from any of these methods may be completely off. This was demonstrated in Figure 12 where thaw strains are generally higher than the curve estimates.”*

**Response:**

We agree with the reviewer that site-specific conditions are essential for accurate thaw settlement predictions. This point is now more clearly stated in the Abstract (lines 29–30) and in Section 6: Uncertainty and Limitations (lines 610–615), where we emphasize that the dataset supports thaw strain estimation at the material level and must be complemented with site-specific data, including local stratigraphy and thaw depth, to estimate total settlement.

**Comment 2:**

*“While the paper did not address it, there is also a possibility that water can infiltrate through thawing layers and exacerbate 'still frozen' layers, which in turn can affect the development of thaw settlements.”*

**Response:**

We thank the reviewer for this insightful observation. A note has been added in Section 6 (lines 614–619) to acknowledge that coupled hydrological and thermal processes, such as water infiltration accelerating deeper thaw, may influence ground response. These processes are not captured by the dataset, which focuses on strain-based responses at the material scale.

**Comment 3:**

*“The paper can be improved by removing some redundancy on the 'benefits,' which was repeated several times throughout the paper, and placing a strong statement either at the beginning or at the end of the paper.”*

**Response:**

We appreciate this suggestion and have revised the manuscript to reduce repetition, particularly in the Conclusions section (line 640 onward), where the key contributions of the dataset are now summarized more concisely. Additionally, the Abstract and Section 6 have been revised to more clearly define the scope and limitations of the dataset, helping avoid overstatement of its applications.

**Comment 4:**

*“The authors have used the context of climate change as a possible precursor for future issues with thaw settlements. It would be beneficial to the reader, and to the improvement of the paper, if the authors can highlight or provide an example how the data they have available in the PTSD can be used to 'predict' future settlements. For any of the data points available, assuming it was frozen at the time it was sampled at a certain depth, what would be the expected settlement today (if a temperature threshold is breached, and considering the recorded climate in the last 30 years)?”*

**Response:**

We thank the reviewer for raising this important point. In Section 6 (from line 609), we now clearly define the intended scope of the dataset. While the data enable thaw strain estimation based on material properties, total thaw settlement also depends on the thickness of the thawed layer, which varies across sites and over time. We now explicitly state that the dataset is not intended to predict future settlement on its own but can support such analyses when used in combination with site-specific or modeled thaw depth inputs.

**Comment 5:**

*“Minor typographical errors: Figure 1.a should be 2.a in Line 104; Line 179, Sec. 0?”*

**Response:**

Thank you for pointing these out. Both issues have been corrected in the revised manuscript.