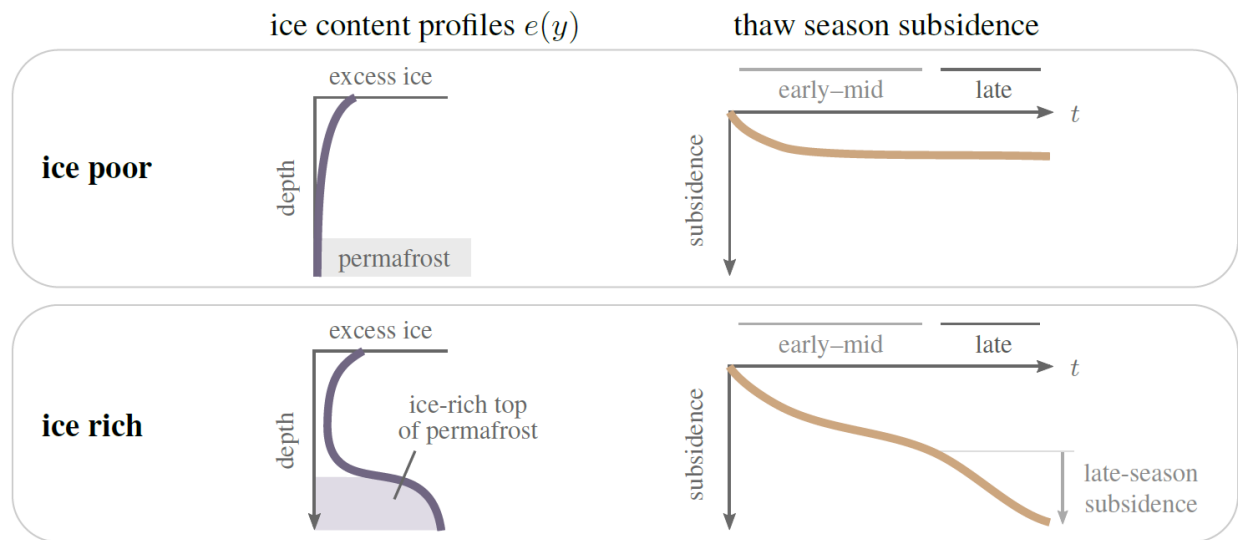


Dear Peter,

Thank you for your additional comments. They have been instrumental in improving the presentation of our results. In our response, we focus on the three major points you identified in your comments.

## 1) Subsidence time series

We have changed all the subsidence time series figures. Subsidence is plotted downward, and the zero point is at the beginning of the time series. Figure 1 now looks like this:



We now also clarify that the subsidence is cumulative. The instantaneous subsidence is consistently referred to as subsidence rate.

A side effect of these changes is that it is more difficult for the reader to deduce the late-season subsidence component. It is particularly difficult to make inter-annual comparisons. This necessitated additional explanations in Fig. 1, the captions and the text.

## 2) Focus

We have restructured the abstract and the introduction to better emphasize our central contribution, which is to assess the suitability of remotely-sensed late season subsidence as an indicator of ice-rich materials in the upper permafrost.

We have strengthened the literature review and now explicitly identify the knowledge gap that "the suitability of these observations for identifying ice-rich permafrost is unknown." We address how our study differs from the InSAR literature.

The conclusions have been re-arranged and tightened accordingly.

### **3) Cryostratigraphy**

We now devote less attention to the cryostratigraphic classification of Shur et al., but we have not eliminated reference to it altogether. The paragraph in the introduction, which we added at the referees' behest, has been removed. The cryostratigraphic interpretation of the Sentinel-1 observations in the discussion has been greatly reduced. While we would rather not interpret the Sentinel-1 observations, the insightful referee reports indicated that many readers will appreciate an explicit link to published field observations.

The challenge of finding a universally accepted terminology is formidable. The terms intermediate, transition, and transient layer have become entrenched, at least in Alaska. But we are aware that the usage is somewhat inconsistent. On a related note, we would prefer to avoid using the expressions active layer and permafrost on multi-annual time scales, but these expressions have also become entrenched.

### **Minor changes**

- Removed titles from the figures and updated captions
- Flipped the vertical colour bars in the subsidence maps.
- We do not talk about vulnerable ground ice anymore; the title has been changed accordingly.
- Added quantitative statistical information (mean, standard deviation) about the inter-annual difference in late-season subsidence to the results.
- Aspect: Added a description that contrasts east and west-facing slopes
- Streamlined the description of the manual mapping exercise

These changes are highlighted in a separate version of the manuscript that we have include in the submission.

Sincerely,

Simon Zwieback