

The Cryosphere Discuss., author comment AC1  
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## Reply on RC1

Dotan Rotem et al.

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Author comment on "Permafrost saline water and Early to mid-Holocene permafrost aggradation in Svalbard" by Dotan Rotem et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-134-AC1>, 2022

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Dear referee #1

**Thank you very much for your comments and support. Our comments are in bold.**

I have reviewed your paper entitled "Permafrost saline water and Early to Mid-Holocene permafrost aggradation in Svalbard". It provides a novel approach to the understanding of permafrost evolution in one of the best studied areas in the polar regions with regards to past environments and permafrost dynamics. Even if I am not expert on the modelling part, I found it well-written and easy to follow. Figures and tables are of good quality. The introduction constitutes a very complete assessment of the research background on the studied topics and objectives of the work. The study area does not provide present day climate data, which would help to frame to understand (past) simulated conditions.

**In our work we relied on data collected at the Longyearbyen airport weather station, located on the fjord coast. There is no data for our inland drilling site, but there is clearly a significant temperature gradient inland, as described e.g. in Christiansen (2005) or Christiansen et al., (2013). As suggested, in the revised manuscript, we will dedicate a paragraph to describe the climate in the area.**

The methodological part is very well described, and the different steps of the research approach clearly exposed. Discussion is concise and summarizes the main findings, comparing it with other areas where Holocene permafrost dynamics has been also examined. Conclusions capture also the main findings of the paper. It would be interesting to add what are the implications of these results for recently exposed (Late Holocene) areas, and how these data can be used to assess on the future evolution of permafrost in Svalbard (aggradation. vs degradation).

**Although our paper is dedicated to paleo-freezing conditions during early to mid-Holocene, we believe there is indeed some implications to current and future trends in permafrost evolution. Basically, our results may suggest that even a short (years to decades) cooling period can slow down permafrost thawing and as pointed out by the reviewer, that recently exposed areas may go through permafrost aggradation even under the current global warming. It is also can point out that although the above ground climate changes fast, remnants of permafrost can persist long time because of local conditions. Actually, it can point out on a spatial process of an area turning from continuous permafrost to discontinues one.**

Specific comments

**We will correct all specific comments as proposed.**

**We will add pictures as proposed.**

Many thanks

Dotan