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The Cryosphere Discussions

Interactive comment on "Permafrost distribution and conditions at the headwalls of two receding glaciers (Schladminger and Hallstadt glaciers) in the Dachstein Massif, Northern Calcareous Alps, Austria" *by* Matthias Rode et al.

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Anonymous Referee #3

(1) Comments from Referee

a) The introduction gives a good general overview of the context of the present study. However, it fails to explain why the methodology of this study was selected and especially what alternatives could have been used.

b) The selection of the four measurement sites needs to be explained and justified in the text.

c) A large part of the discussion focuses on the comparison of the results of this study with the ones obtained by Boeckli et al. (2012) using a permafrost model. In order to follow it better and fully grasp the implications of this study it would be necessary in my opinion to include an additional figure showing the permafrost extent obtained by the model for the entire study region.

d) The discussion section presents and discusses the relation between the measured resistivities and the time since the deglaciation at the profile location. This is a very interesting point, which should be developed more in the manuscript.

e) However, highly resistive anomalies can also be due to the presence of large air-filled clefts.

f) This section (conclusion) needs to be carefully revised

g) Specific comment: P5 Figure 2: On the map, the glacier retreat from 1915 to 2009 is shown. It would be very interesting to have also this information on the pictures below. For the interpretation of the ERT and temperature measurements it is important to know where is located the glacier extent of 1915.

h) Specific comment: it is assumed that permafrost is currently degrading in rock walls... What is the basis of this statement?

i) Specific comment: One of the most important point of this study is that the measurements are done in a newly deglaciated area and this section provides information on the subject.

(2) Author's response

a) We clarified our scientific focus in all chapters and focused the aims of this study: Detection, delimitation and characterization of permafrost in the rockwalls surrounding the

retreating Schladminger and Hallstatt glaciers in the Dachstein area and thus, to contribute to the question how widespread glacier retreat will affect permafrost degradation and/or aggradation. The reasons for our choice of methods have been substantiated.

b, c) The chapter “study region” was revised and now contains the suggested additional information.

d, e) The Discussion section has been entirely restructured and rewritten. It now follows the structure (1) General distribution of permafrost; (2) Significance of the ERT results; (3) Aggradation or degradation of permafrost. This allowed us to develop much more concrete conclusions. We gave additional reasons why we think that air-filled cavities are highly improbable.

f) The Conclusions were focused and shortened. This allowed us to reach much more concrete conclusions, particularly on the question of permafrost aggradation vs. degradation.

g) ?

h) See response to comment (f).

i) We fully agree. As mentioned before, we clarified our focus and we have moved this point more to the centre of the discussion.

(3) Author’s changes in manuscript

Due to the reviewer’s suggestions, the paper has been thoroughly revised. Many passages were completely rewritten and considerably shortened in this process. Due to the extensive changes, it was no longer possible to track the individual changes.

The new manuscript is added as supplement file.

Please also note the supplement to this comment:
https://www.the-cryosphere-discuss.net/tc-2018-281/tc-2018-281-AC3-

supplement.pdf

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2018-281, 2019.

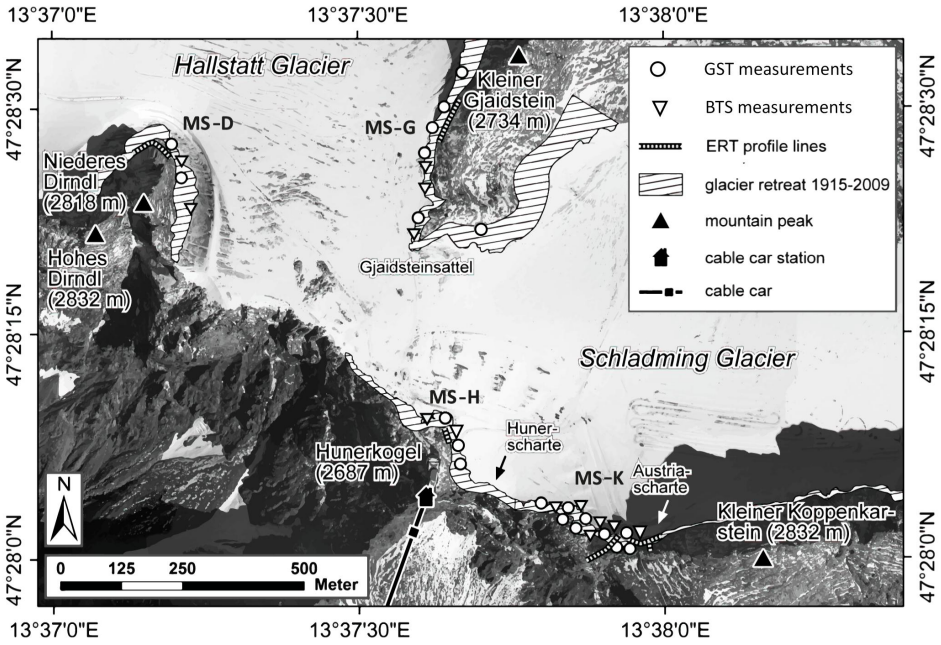

Fig. 1. Figure 3: Measurement locations of the different techniques (BTS, GST, ERT) at the studied rockwalls. Data source: Orthophoto by Province of Upper Austria 2013

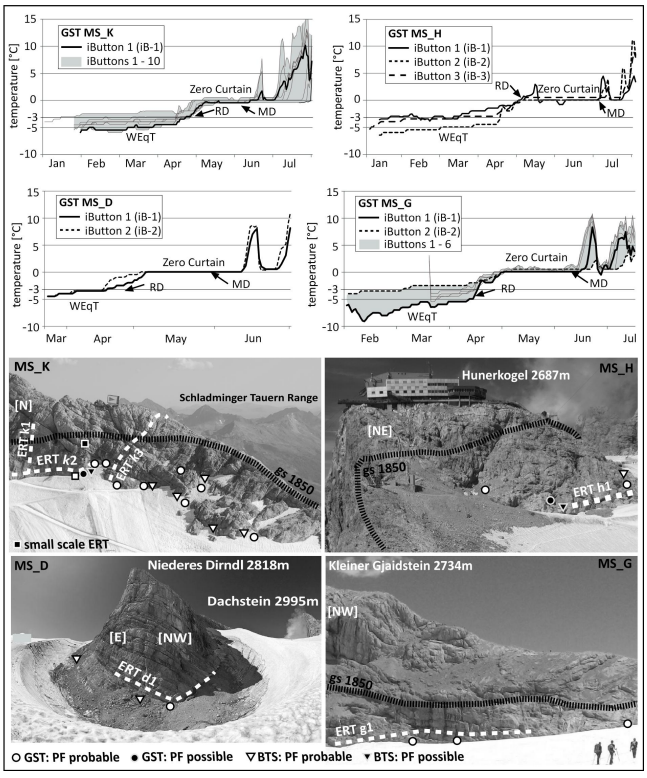

Fig. 2. Figure 5: GST measurements from January 2013 to July 2013 and measurement locations of the different techniques at the studied rockwalls including interpretation of results of the GST and BTS measurem