

The Cryosphere Discuss., referee comment RC1
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Comment on tc-2022-165

Anonymous Referee #1

Referee comment on "Brief communication: Combining borehole temperature, borehole piezometer and cross-borehole electrical resistivity tomography measurements to investigate seasonal changes in ice-rich mountain permafrost" by Marcia Phillips et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-165-RC1>, 2022

Over the past decades, Switzerland have been a world leader in the development of measuring and monitoring techniques and research on rock glaciers. This is another contribution in this context. M. Phillips et al. did an excellent job in compiling and presenting promising instrumentation techniques and first results on borehole temperature, borehole piezometer and cross-borehole ERT measurements, aimed to investigate ice-/water contents in an ice-rich rock glacier with heterogeneous characteristics. This short manuscript reads easily and with the inclusion of the few below mentioned suggestions in a revised version of the manuscript, I recommend this brief communication for publication in the TC.

L20: Consider one or two sentences that briefly summarize the major advances related to modern quantitative measurements of geophysical parameters on rock glaciers in the Alps, from e.g. Vonder Mühll and Haeberli (1990) until today.

L23-27: Maybe worth mentioning one or some previous studies on rock glaciers that used similar approach as your study, with a combined application of geophysical techniques with cross-hole experiments (georadar cross-hole tomography). e.g. Maurer et al. 2003., Musil et al. 2006 and Springmann et al. 2012. Although these studies aimed at delineating internal structure and investigating the stability of rock glaciers, there are some relevant findings that could be discussed in light of your results.

L44: The use of "continues measurements" in this respect is somewhat misleading as data presented are only for one day in summer and for one day in mid-winter. Consider rephrase.

L137-138: Is there a citation to backup the statement regarding piezometer data and how ice formation might affect the pressure?

L157-159: Include a couple of sentences with some more details about the future plans for this work and monitoring. What could a more in-depth analysis, and e.g. more data from all seasons and inter-annual variability add to new knowledge?

H.R. Maurer, S.M. Springman, L.U. Arenson, M. Musil, D. Vonder Mühll Characterisation of potentially unstable mountain permafrost — a multidisciplinary approach. Proceedings of the 8th International Conference on Permafrost, Zurich, Switzerland (2003), pp. 741-746

Musil, M., Maurer, H.R., Hollinger, H. and Green, A.G., 2006. Internal structure of an alpine rock glacier based on cross hole georadar travel times and amplitudes. *Geophysical Prospecting*, 54 (3), 273–285.

Springman, S.M., Arenson, L.U., Yamamoto, Y., Maurer, H., Kos, A., Buchli, T. and Derungs, G., 2012. Multidisciplinary investigations on three rock glaciers in the Swiss Alps: legacies and future perspectives. *Geographiska Annaler: Series A, Physical Geography*, 94, 215–243. doi:10.1111/j.1468- 0459.2012.00464.x

Vonder Mühll, D. and Haerberli, W., 1990. Thermal characteristics of the permafrost within an active rock glacier (Murtèl-Corvatsch, Grisons, Swiss Alps). *Journal of Glaciology*, 34 (123), 151–158.