

Interactive comment on “Strong changes in englacial temperatures despite insignificant changes in ice thickness at Dôme du Gôûter glacier (Mont-Blanc area)” by Christian Vincent et al.

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Response to Reviewers:

We thank the Reviewers for their comments and suggestions to improve this manuscript. We address their comments below. Reviewers comments are in italics, and our responses are in normal font below. Changes to the text have been highlighted in the revised manuscript.

Reviewer 1 : Jon Ove Hagen

C1

In this paper the authors show the impact of recent climate changes on the mass balance and internal temperature of an ice body at very high elevation above 4000 m in the Alps. There have been many papers published about the development of glaciers with rapid shrinking mass in the Alps during the last 50 years, but very few have looked into the snow and ice at very high elevations where surface melt is very small and permafrost conditions exist. There have been papers published about the permafrost conditions in the mountains and the gradual warming of the permafrost. However, very little has been done on snow and ice at this very high elevation. The permafrost conditions in rock is mainly affected by heat conduction while the snow and ice also is affected by the release of latent heat when surface melt refreezes in the snow. This is nicely shown in this paper. It is a very interesting paper complementing studies at lower elevations and is a valuable contribution. The conclusions are substantial and well documented from the presented data. The paper is well written and structured. It is easy to follow and read. The language is clear. In my opinion it can be published almost as it is.

I only have a few very minor comments on details listed below.

l. 16. They could write: This is due to less snow accumulation and is consistent . . .

It has been done.

l. 18. . . . reaching 1.5 C increase at a depth .. (add: increase)

It has been done.

l. 61. It would be good to indicate how deep the boreholes are, maybe just say: .. four deep boreholes down to a maximum of 126m have been drilled : : :

It has been done.

l. 85 “Twenty stakes were set up in 1997 (Fig. 1)” However, no stake locations are shown in Fig. 1. They could refer to Fig. 4 or say that twenty stakes were distributed in the area shown in Fig.1.

C2

Done.

l. 91. theolodite should be theodolite

Done.

l. 183 “the density of firn.” They could indicate this density: “the density of the firn which is about xx kg m⁻³”

It has been done.

l. 204. “Englacial temperatures were measured down to the bedrock at 126 m depth at the same: : : so add “at 126 m depth”

It has been done.

l.334. “due to a change in snow accumulation and ..” Rather: due to less snow accumulation and. . .

It has been done.

l. 341 “..propagated down to the glacier and..”. Rather: “.. propagated down through the glacier and..” or “..down into the glacier and..”

It has been done.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-158>, 2019.