Response to Reviewer 2

We thank the reviewer for her/is comments and to bring very relevant studies to our attention.

The paper presents an emerging methodology to measure snow depth at a plot of 100m2 based on TLS technology. The majority of the paper is devoted to characterize and evaluate the accuracy of the device, and a shorter part of the manuscript presents the evolution of the snow depth that results particularly interesting when it is referred to Dome C site in Antarctica. The paper is clear and well written, and a device like the presented here (or similar that are currently being used) seems a much better approach to measure snow depth, compared to ultrasonic sensors or single laser measurements.

-The introduction is well written and concise. I simply add a few references dealing with spatial variability of snow just in case authors consider useful they inclusion in a revise version:
*Clark, M. P., Hendrikx J., Slater A.G., Kavetski D., Anderson B., Cullen N. J., Kerr T., Hreinsson E. O, Woods R.A. 2011. Representing spatial variability of snow water equivalent in hydrologic and land-surface models: A review. Water Resources Research 47: W07539, doi:10.1029/2011WR010745.
*López-Moreno J.I., Fassnacht S.R., Begueria S., Latron J. 2011. Variability of snow depth at the plot scale: implications for mean depth estimation and sampling strategies. The Cryosphere 5: 617–629.
*Neumann N.N., Derksen C., Smith C., Goodison B. 2006. Characterizing local scale snow cover using point measurements during the winter season. Atmosphere-Ocean 44: 257–269.
*Shook K., Gray D.M. 1996. Small scale spatial structure of shallow snow covers. Hydrological Processes 10: 1283–1293.

We added these references at relevant points in the text.

-I am not sure if this is the first publication in a SCI journal of the application of a device like this, but perhaps authors should clarify this point or mention other similar initiatives or the existence of more commercial products that can be used (see as example: https://cnnweathercenter.wordpress.com/2012/02/15/scientists-deploy-lasers-gps-technology-to-improve-snow-measurements/).

To our knowledge, this is the first publication in a SCI journal with such a temporal repetitivity. A project using a commercial TLS has been presented at AGU2014 and 2015 (https://agu.confex.com/agu/fm14/webprogram/Paper17768.html) and results may be published in the peer-reviewed literature. Nevertheless, even if it was published in a SCI journal, it is a very different approach that has some advantage (much larger surface area) and drawbacks (cost an order of magnitude larger) which radically change the possibilities in terms of number and type of monitored sites. It seems difficult to add such ephemeral and subjective information in the paper because there is no citeable sources and the successful outcome of any ongoing initiative depends on the robustness (and chance to some extent).

- In alpine sites, but specially in Antarctica, is very frequent having blowing snow near the surface, that should affect the collection of proper snow depth data. Although blowing snow is mentioned as a source of failure at the beginning of page 9, it is more related to the jamming of the stages rather than collecting erroneous laser returns. It can be also mentioned.

We have addressed this point where causes of failure were identified (section on operating results): “Erroneous laser returns due to air-borne particles was a minor issue only. The data accumulation

and filtering done by the lasermeter internal software and the filter we implemented removed any occasional short range acquisitions."

- Probably the spheres installed in Dome C can be shown in an additional photo in Figure 1. this is just to have a better idea on how they look like.

We have added a picture.

- Page 12line 28; should be "below" instead of inferior?

The sentence has been changed according to Reviewer 1 proposition.

-Page 13 line 16 GLACIOCLIM stake network, instead of stack.

Corrected.

- Figure 3 and 4 can also show the daily evolution of standard deviation (or coefficient of variation) at the analysed plots. It can be done just adding a new y-axe at the right side.

The daily spatial standard deviation is already shown as green bars, and we feel useful to superimpose this information on the snow depth time series itself rather than on a separate axis.

- Figure 4 could contain also another small panel with the daily temperature to see failure of the sensor is related with the very low temperatures mentioned in the text.

The failure was not directly related to temperature. Our statement was that air temperature has been under the operating specifications (-40°C) for at least 6 months before the failure which means the heating element worked hard and for a long time. However, we do not know if this is the cause and the heating element was not broken as it worked again later. We think adding daily temperature won't bring new information with respect to the general statement that temperature is often under -40°C at Dome C.