Detailed Answer to reviewer #2:

This paper quantifies the fraction of total snowfall that falls in the world mountains as well as the absolute amount of snowfall in the mountains, based on the CloudSat radar and different reanalyses. It analyzes the different datasets and gives possible explanations for the differences seen in the datasets, especially as it comes to the absolute amount of snowfall. A significant effort was made to compare the different datasets on the same grid, rigorously. The paper is well written and informative, and I think it deserves to be published.

However, some points need to be analyzed in greater depth. I have one major comment and many smaller changes I would like to see in the final version of the paper. This won't require new work on the data though (I believe).
Thank you very much for this constructive review, the major and minor comments you mentioned will be included in the new version of the paper if it is accepted. Your comments will be answered in blue in the following text.

Major comments:
My major comment is the following: the maps (Figure 2) are great, but not analyzed at all, and it is a shame, because they DO contain a lot of information. The authors say "the geographical distribution of mountain snowfall is similar between CloudSat and all the reanalyses", but I disagree. There are many interesting differences. I think the authors must work more on the maps, by considering for example maps of the differences between the different datasets, or by computing mean RMS errors between each reanalysis and CloudSat (even though I understand CloudSat has its own uncertainties).
For example, in the case of MERRA-2 (which clearly stands out), there is a lot of snowfall over the mountains of eastern Russia and Kamtchatka, more than for MERRA-1.
Why ? JRA55 seems to miss a lot of the patterns too. Please elaborate more on these interesting maps !
We agree with you, Figure 2 needs and deserves more explanation and we agree that there are many interesting differences. In the potential next version of the article, we can add more discussion and go deeper in the analysis. We have done it for South America as mentioned in Sections 4 and 5 but we could talk more about some regions that stand out such as eastern Russia. A plot of the differences between CloudSat and the different reanalyses can be added to the paper to help us in the analysis.

Minor comments:
l.34 : "the fraction of mountain snowfall" is ambiguous; the authors might want to change it to something like "the proportion of snow that falls in the mountains compared to the continent as a whole".
Yes, thank you. This will modified in the next version of the article.
l.37 : I agree with the authors point regarding the large-scale forcings, and it is an interesting conclusion of the paper; all the models predict precipitation when air masses are converging. but I disagree on the point that the differences in the snowfall amounts result from differences "at smaller scales". As said line 327 in the conclusion, it is more likely due to differences in the physical parameterizations of the models, as well as subgrid-scale parameterizations of orographical effects.
We totally agree with you and that's also what we thought when we saw the results but apparently our formulation of this idea was not correct. We will revise this part of the text to be more explicit.

l.84 : what do the authors mean by "is more realistic" ? and what does it have to do with the previous sentence ?
This sentence has been reformulated, so it follows more logically the previous one.

l.93 l.97 l.117 l.120 : you might be interested in the papers of my colleague, F. Lemon-nier, on that subject :
CloudSat-inferred vertical structure of snowfall over the Antarctic continent F. Lemonnier, J.-B. Madeleine, C. Claud, C. Palerme, C. Genthon, T. L'Ecuyer, N. Wood JGR Atmospheres, doi:10.1029/2019JD031399, December 2019
Evaluation of CloudSat snowfall rate profiles by a comparison with in-situ micro rain radars observations in East Antarctica F. Lemonnier, J.-B. Madeleine, C. Claud, C. Genthon, C. Durán-Alarcón, C. Palerme, A. Berne, N. Souverijns, N. van Lipzig, I. V. Gorodetskaya, T. L'Ecuyer, N. Wood The Cryosphere Discuss., doi: 10.5194/tc-2018-236, March 2019
Thank you, these references will be added to the text in the related section.

l.154 : I believe the Snow Retrieval Status (SRS) in release 5 was improved, and this might help select the profiles the authors use, especially in mountainous regions where the ground clutter might affect the retrievals. I am not saying that the authors should use release 5 and redo everything from scratch (please don't !), but that they might want to check if release 5 gives different results or not, just in case !
Yes, we can include a couple of sentences on how the last two versions of CloudSat differ.

l.167 : "somewhat compensated by the competing effects of evaporation and undetected shallow snowfall" ; I have not read Maahn et al. (2014), but this sounds quite speculative to me. A lot can happen between the 1200m level and the surface, especially in mountains (slope winds, complex boundary layer). I think the authors should remain cautious about this point, and not say there is some kind of compensation of errors.
This sentence will reformulated to be more conditional.

l.168 : this should be said earlier, when describing the CloudSat dataset.
Yes, it is now said at the beginning of this section.

l.174 : "less than about 15% at the surface"; what is "the surface" here ? the 1200m level ?
This will be clarified in the next version of the article.

l.189 : "assimilates" > uses, is based on
Thank you, this sentence will be reformulated.

l.199 : "while CloudSat started in 2007" this should be said earlier, when describing the CloudSat dataset.

Yes, this will be said earlier in the text, in the section concerning CloudSat.

l.206 : "based on the Kapos et al. (2000) definition" : could the authors summarize the criteria that define a mountainous terrain ?
We have tried to summarize their technic in the text adding more explanations.

Their technic was quite complicated so it was difficult to add a general description, but more explanation will be added on the technic Kapos et al. (2000) used to define a mountainous terrain.

l.233 : "In spite of these differences, the geographical distribution of mountain snowfall is similar between CloudSat and all the reanalyses" : as mentioned above in my major comment, I disagree, we see large differences between the different datasets, and these spatial differences might be part of the reason why the absolute amount of snowfall differs between them.
Yes, this point will be clarified and more analysis will be added to the text for Figure 2.

l.258 to 261 : does this mean that the CloudSat estimate, which is already high, is probably a lower bound, because it might miss some large events ? if so, this should be said in the text.
CloudSat is certainly missing some large events but we hope that, as we have done this work on many years, the sample size is big enough to avoid a big effect on CloudSat estimates.

l.268 : "To ease the comparison between the different datasets" I don't understand why the amounts are normalized; to me it makes things more difficult to understand, with very different y axes. Are the authors sure it is the best way to represent this ?
We first tried to look at the results without the normalization and we could not compare the results between the different datasets. The snowfall estimates are so different between the different datasets that we needed to include the normalization by grid points. For some datasets, it snows on much more grid points than other ones, but it does not snow a lot for example. We also wanted to normalize it by the grid cells to have a better feeling of what is happening in each reanalysis as they are based on models.

Table 1 : I don't understand the row entitled "Global" : for example, 1763/43403 means that when the four continents are put together, 1763 cubic km per year of snow falls in the mountains (i.e. the sum of the rates for the four continents, which is not always exactly the case by the way...), but I don't understand the number "43403"; does it include Greenland and Antarctica ? it is much bigger than the sum of all the snowfall amounts. Please clarify.
Yes Global includes Greenland and Antarctica but this will be clarified in the text and in the Table.

Figure 4 : How is this frequency computed exactly and how comes this is so different between the different continents ? Please clarify.
Yes, this can be clarified in the potential new version of the article.

Typos:
l.57 : "the response of" can be removed
Thank you, it will be removed.
l.288 : "for MERRA-2", remove "for"
Thank you, it will be corrected.
l.312 : "for researchers for"
Thank you, it will be corrected now.
l.317 : that THEY have difficulties ?
Thank you, it will be corrected.
Figure 4, y axis, upper left panel : occurence > occurrence
Thank you, this has been corrected in the text.