

Decision on amt-2021-216

Dear authors,

Thank you for submitting your revised manuscript and your responses to the reviewers.

After consideration I am again asking for minor revisions. Specific points to address are below.

Regards,

Raquel Evaristo.

Comments from reviewer 4 were responded carefully, however, I noticed there was little or no effort in including the points raised in the manuscript.

In particular, concerning the comments numbered 2 and 4, the authors took a lot of effort to respond to the reviewer, but none of that was included in the document. The reviewers comments are supposed to be a way to improve your manuscript, and not merely a response to certain personal doubts.

Very specifically, when responding to comment 2. you say that “This advantage has been stressed out in a lot of parts of our manuscript, e.g., lines 26-29 or 886-889“, but these two instances are describing results. I believe the reviewer meant that you should formulate clearly the advantage of your approach. Ideally this should be included in the introduction as a motivation point for this study (your section 1.3), while comparing and stressing the advantages over other approaches.

Then include the response to comment 4 in your discussion, effectively showing you compare your calculation with the calculation from other methods and obtain a result that seems to be more accurate (at least according to your comparison with the IWP from MODIS, for example). Ideally in situ observations should be taken for validation. Would be good to add a comment on this point.

Same with comment 6. Lines 684-693 discuss the error propagation and how it affects Dm but never mention how it affects IWC. Your response to this comment, and particularly the end, acknowledging that this point needs sensitivity studies to improve the methodology in the future should be included in the paper.

Minor comments:

Lines 32-33:

“terrestrial radiation interfering to the Earth’s evergy budget” replace with:

“terrestrial radiation interfering with the Earth’s evergy budget”

Line 55: Include references concerning dual frequency.

Line 57: “to the” is repeated

Line 110: replace “constrained” with “constrain”

Line 123: Include a reference where the readers can find information on polarimetric variables.

Line 234: replace “resulting to a single radar cross-section” with:

“resulting in a single radar cross-section”

Line 236: The sentence is not constructed properly. Maybe add “In another approach...”

Line 240: replace “This approach can result nine...” with:  
“This approach can result in nine...”

Line 359: Appendix B is mentioned before Appendix A. Switch the Appendixes accordingly so that A comes first.

Lines 376 -380: You are using an event from the 4<sup>th</sup> of April 2019 to find the calibration bias for events in January 2019. How can you be sure of the stability of the calibration more than 3 months later?

Line 401: I suspect that here it should be “calculate DWR errors” instead of “calculate DWR values”. Please check.

Line 418 (legend of figure 5): “the POLDIRAD and MIRA-35 spatial mismatch” is repeated.

Line 559: replace “Combining the PSD and with the m(Dmax)” with “Combining the PSD with the m(Dmax)”

Figure 11 a: Adjust the color scale between reasonable values for your variability.

Line 812: This formulation “once with twice...” is confusing.  
Suggest: “...for oblate ice particles, 1) with twice and 2) with half the density...”

Line 949 Legen of figure A1: panel c) shows a scatterplot of the median Zdr vs height. Why are there only a few points? How were these points selected?

Lines 965 to 974, Appendix B:

There are polarimetric algorithms available for melting layer detection designed for RHIs. One example is Wolfensberger et al. 2016. This discussion could be shorter if you just mentioned other optimized methodologies could be used instead of your hard thresholds.

Wolfensberger, D., Scipion, D. and Berne, A. (2016), Detection and characterization of the melting layer based on polarimetric radar scans. Q.J.R. Meteorol. Soc., 142: 108-124.  
<https://doi.org/10.1002/qj.2672>

Line 974: “only few ice hydrometeors were detected above the 0°C isotherm”. This does not make sense to me. Please check.