

## Comments to the author:

Decision on Retrievals of ice microphysical properties using dual-wavelength polarimetric radar observations during stratiform precipitation events

By Eleni Tetoni, Florian Ewald, Martin Hagen, Gregor Köcher, Tobias Zinner, and Silke Groß  
Submitted to AMT

Thank you again for your reviewed manuscript, which is again improved compared to the previous version.

There is still one problem left: Zdr bias may not be stable from January to April, and there is no way to be certain of that unless the bias is checked regularly. The papers you cited do not show stability over periods as long as 3 months. I understand this comes at a late stage in this process, and I apologize for that. However, this needs to be addressed.

Bellow are a few minor points I still found in the manuscript that should be considered.

Dear Editor,

Thank you once again for your time and your comments to our manuscript. In the following lines you can find our replies written with blue color. Regarding your comment about the ZDR bias stability, after studying the suggested book we found Fig. 6.7 where the ZDR bias remains stable for almost a year for the S-band Columbia WSR-88D (0.2 dB). Moreover, Fig.11 in Ryzhkov et al. (2005) shows that ZDR calibration accuracy during JPOLE was estimated about 0.2 dB. After your recommendations, we created a ZDR histogram following Ryzhkov's approach and the results are shown below as well as in the supplementary of this manuscript. We have also added the following lines to our Sect. 3.1.2:

*"To further ensure the stability of ZDR bias, an additional calibration validation was conducted following the Ryzhkov and Zrnice (2019) approach (described in their Sect. 6.2.4). Our measurement dataset from January 2019 was filtered for large Ze regions and intermediate temperatures for dry and large aggregates. This analysis yielded a median ZDR = 0.2 dB for these areas, where ice aggregates are expected, indicating that POLDIRAD was well calibrated during the period of this study."*

Thank you for your time and feedback once again.

Kind regards,  
Eleni Tetoni

Ryzhkov, A. V. and Zrnice, D. S.: Data Quality and Measurement Errors. In: Radar Polarimetry for Weather Observations, Springer, Cham., [https://doi.org/10.1007/978-3-030-05093-1\\_6](https://doi.org/10.1007/978-3-030-05093-1_6), 2019.

Ryzhkov, A. V., Giangrande, S. E., Melnikov, V. M., & Schuur, T. J. (2005). Calibration Issues of Dual-Polarization Radar Measurements, *Journal of Atmospheric and Oceanic Technology*, 22(8), 1138-1155. Retrieved Jun 8, 2022, from [https://journals.ametsoc.org/view/journals/atot/22/8/jtech1772\\_1.xml](https://journals.ametsoc.org/view/journals/atot/22/8/jtech1772_1.xml)

Line 65: Instead of defining N as the number concentration I think it is more illustrative to define N(D) as the particle size distribution.

Thank you, we corrected accordingly.

Lines 253-254: The acronym was just defined in the previous page, just use PROM afterwards.

Thank you a lot, the acronym was replaced.

Line 348: The title of the subsection 3.1.1 is “Ice mask and noise filters application”, but you do not really describe any of the other filters in this section. I suggest that you remove the second part of the title and just call this section “Application of the ice mask”.

Thank you for stressing this out. We have now replaced the title considering your suggestion.

Line 515: “and thus, from the mass” should be replaced with “and thus, by the mass”.

We now corrected that, thank you.

Line 844: There’s a double period mark here.

Double period mark was removed and a typo was also fixed.

Line 847: In the IWC formula using KDP, which was defined to be used at S-band, did you scale the KDP with the wavelength?

Thank you very much for your valuable comment. We haven’t scaled our KDP with the wavelength. After doing so, we noticed also differences in our comparisons which were also included in the text.

Line 975: The figure B1c has different colors for different origin of filters, that are not all grey, so remove “grey” in the legend referring to c.

The word “grey” is now removed. Thank you for pointing this out.

Non-public comments to the Author: About the Zdr calibration issue, are there any vertical scans even performed (even in snow) at a closer time (less than 1 month)? Alternatively, could you plot a histogram of Zdr for all the snow events you use in the manuscript and check that you have a reasonable value as expected for aggregates? There is a methodology somehow like this described in (Ryzhkov and Zrnica 2019 (“Radar Polarimetry for Weather Observations” book, section 6.2.4)), and the expected value should be below 0.2 dB. If you find that your Zdr bias indeed changed compared to April, hopefully not too much, just comment on how that should affect your retrievals. You do not need to do all calculations again.