Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-221

Anonymous Referee #1

Referee comment on "An adaptive echo attenuation correction method for airborne Ka-band precipitation cloud radar based on melting layer" by Dongfei Zuo et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-221-RC1, 2021

The paper presents a method for the attenuation correction of the airborne Ka-band cloud radar. The methodology that has been used is very simple in its roots and I suggest to present it in a simpler way. In most cases a re-read can set the context, but you don't want to impose additional work on the reader. The scientific significance of the paper could be greatly improved if not only the method itself is presented but also how well it works in a more statistical way. For example, a long term validation of the algorithm over the Rayleigh targets at the cloud top when the aircraft is located below the freezing level. Alternatively a different multifrequency dataset can be used (OLYMPEX, IPHEx are publicaly available). If the presented method is applied to these data the data collocation issue is greately reduced and the low frequency radar can be used as the unattenuated reference for the path integrated attenuation estimates, in particular in case of small precipiattion rates.

Major comments:

1. The English usage is fair but inconsistent and difficult to understand at some places. The text needs a careful revision for usage and punctuation. I made some comments in the pdf file but these comments are only a fraction of corrections that need to be made.

2. The title. It should reflect more the content of the manuscript. In fact, the paper shows just an application of the attenuation correction to the several precipitation events.

3. The way the attenuation correction method is presented looks very complicated but in fact it is not. The whole approch is based on the detection of the freezing level. Below the zero degree isotherm a selected attenuation-reflectivity formula is used based on the reflectivity regime. Above the freezing level a fixed formula is used. The rest of the work is just to integrate the extinction profiles along the propagation path that depends on the airplane altitude.

4. The methodology is besed on separating the data into two groups: snow/ice and everything below the melting level. In fact the scattering properties of melting snow are very different from those of rain. Matrosov (2008) showed that the melting layer attenuation is stronger than in rain for the same path and precipitation rate.

5. The number of the presented events is unnecesserily large. One case study would be enough to show the algorithm.

Technical comments are in the attached *.pdf file

Please also note the supplement to this comment:
https://amt.copernicus.org/preprints/amt-2021-221/amt-2021-221-RC1-supplement.pdf