Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC2
https://doi.org/10.5194/amt-2021-221-RC2, 2021

Comment on amt-2021-221

Anonymous Referee #2

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-RC2, 2021

The paper proposes an attenuation correction for Ka-band radars.
The paper is way too long and convoluted for the limited amount of information it actually brings to the reader. I do not see any real novelty;
also simple messages
are not really properly conveyed. While there is merit in Ka-band attenuation correction methods, in my opinion this work does not seem to really capture the state
of the art and does not provide a significant step forward in the field.

Major comments:
1) Snow attenuation: the values of (light) snow attenuation are exteremely low (<0.1 dB). Therefore there is no way to properly validate these results
(miscalibration, volume mismatching, frequency mismatching, etc will produce errors much bigger than such value). So I do not see any value
in this because no real conclusions can be achieved. In convection ice of course can start producing significant attenuation at Ka
but this is not addressed by this paper in any way.

2) The overall design of the methodology is very weak. By definition the volumes of the S-band ground based and the Ka-band radar can be very different.
In particular the vertical resolution of the S-band can be very coarse. Not sure what kind of interpolation you used in your figures
for the S-band but really I do not see this as a viable methodology to assess an attenuation correction. Much better to use multi-frequency
matched beam aircraft or ground based radars which are available. There is also no mention of cross-calibration between the S and the Ka-band radar (which should be
a key aspect).
3) Not sure I have fully understood how the attenuation in rain works (it seems the authors are using the same coefficients as in ice, item 5 at page 6?
Of course it is well known that rain is attenuating much more than ice. Also the authors do not compute any enhancement of attenuation due to the
melting layer (a lot of work has been done on this topic also at Ka band). So really I do no see any value of this apart saying that rain will produce
some attenuation that must be accounted for (as everybody in the field knows).

4) There is no mention at all of the fact that S-band and Ka band unattenuated reflectivities are not generally the same, due to non-Rayleigh effects. Discussion of the impact of such assumption should be provided.

Other comments:
English needs extensive revision.
Attenuation is measured in dB not dBZ.
For your k-Z relationship you should provide units for k and Z.