

Dual-frequency spectral radar retrieval of snowfall microphysics: a physics-driven deep learning approach

amt-2022-199

Responses to reviewers

A.-C. Billault-Roux, G. Ghiggi, L. Jaffeux, A. Martini, N. Viltard and A. Berne

February 2, 2023

We thank S. Kneifel and one anonymous reviewer for their positive feedback on our manuscript.

We took into account the technical corrections suggested by S. Kneifel, listed below. In addition to these changes, we modified the y-axis of Fig. 15 in which the units were incorrect.

It would be nice if Fig. 14 and Fig. 15 would include a legend or description for the different line colors. While it is understood that for Fig. 14 the different parameters have been randomly chosen, the parameter μ is varied linearly for Fig. 15 and could thus be easily included in a legend. This would help to understand the sign of the d_{μ} - d_{Skew} relationship and enhance the reproducibility.

Each colored line corresponds to a different (time, range) gate, for which we vary D_0 . The change in skewness caused by a modification of PSD shape at this same (time, range) gate is indicated with a horizontal lines (min and max change when varying μ from -2 to 5). As it turns out, the maximum increase in skewness always corresponds to $\mu = 5$, and the maximum reduction of skewness corresponds to $\mu = -2$. We now clarify this point in the caption:

The caption of Fig. 15 now reads:

Colored lines with scattered points: relative change in W-band skewness γ_W ($\Delta\gamma_W/\gamma_W$) caused by adding a diameter offset ΔD_0 on microphysical descriptors of selected (time, range) gates, if assuming an exponential PSD. **Horizontal lines: for each of these (time,range) gates, maximum relative change in skewness caused by a modification of the PSD shape (assumed a gamma distribution, μ in the range [-2, +5]); the maximum increase (resp. reduction) in skewness, in full line (resp. dashed) is consistently obtained for $\mu = 5$ (resp. $\mu = -2$).** For each selected (time,range) gate, the intersection of the horizontal and colored lines gives a ΔD_0 value which causes the same relative change in skewness as a change in PSD shape (worst case). Dashed vertical lines show the mean of these ΔD_0 values.

L634 (marked-up version): “while attenuating strongly millimeter-wavelength signal” -> “while it can strongly attenuated the millimeter-wavelength signal”

Fixed.