Re: Drop Size Distribution Retrieval Using Dual-Polarization Radar Observations at C-Band and S-Band

Dear Editorial Team of AMT,

We would like to again extend our sincere gratitude to you and the reviewers who have been very generous with their time and effort in helping us improve our manuscript.

The few suggested minor revisions have been incorporated.
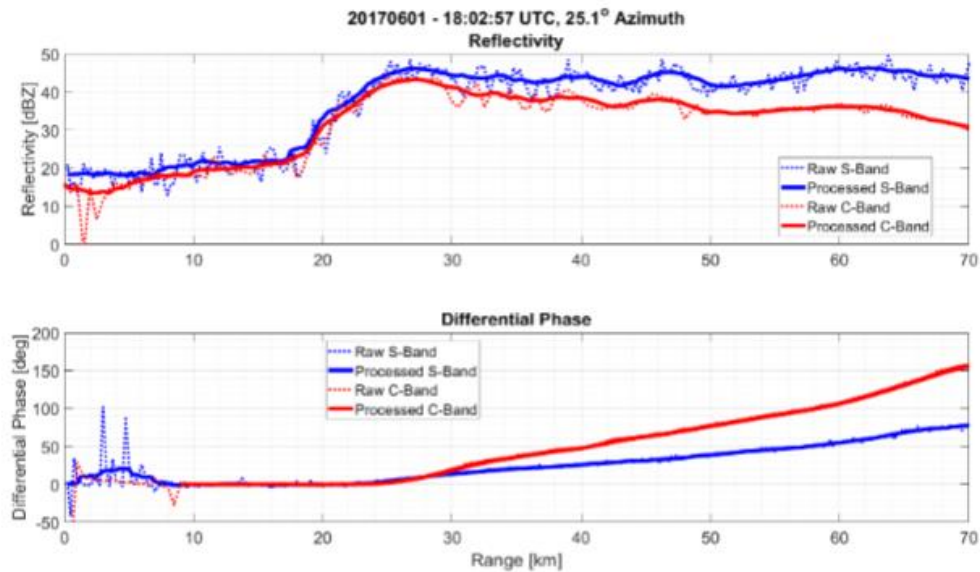
Thank you,

Dan Durbin
Yadong Wang
Pao-Liang Chang

Comment Number:
1
Comment:
Figure 4: Please set the y-lim of the differential phase to [-50 - 200]
Reply:
We have updated the y-axis limits as suggested:

Figure 4. The data along the radial indicated in Figure 3 before and after processing. Raw radar data (dashed lines) are contrasted with post-processed data (solid lines). Processed C-band reflectivity is not used as a retrieval input but is useful for validation purposes as discussed in Section 3.1

Manuscript Update:
Revision:
Figure 4
Redline Version:
Figure 4

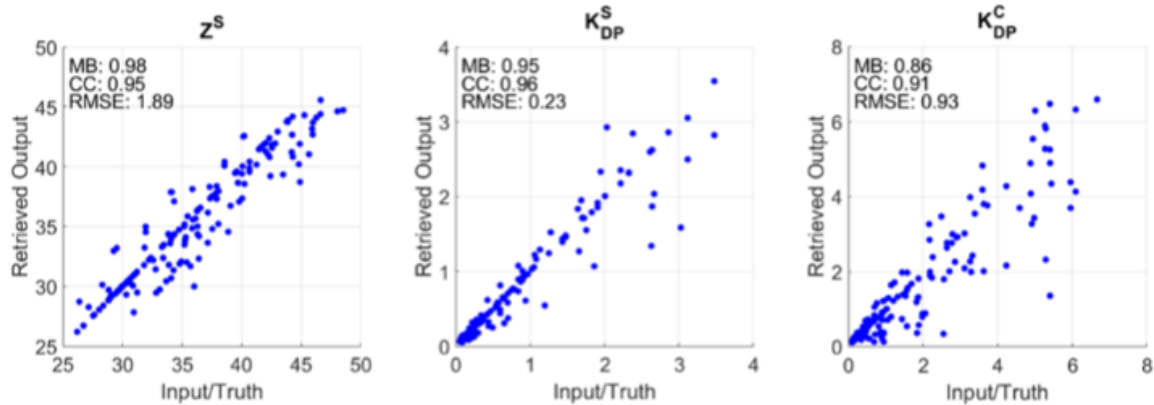| **Comment Number:** |
| --- |
| 2 |

Comment:
Figure 12: Please add some quantification metrics to each subplot.

Reply:
We have updated Figure 12 to include RMSE, mean bias, and the correlation coefficients. The referenced standard formulas for each have been added to the main body text.   **Figure 12.** The retrieved calculated value of each parameter (y-axis) is shown relative to the algorithm's input (x-axis) based on the radar measurements at the final gate (disdrometer location). The results in terms of MB, CC, and RMSE are included.

Manuscript Update:
Revision: Figure 12 Lines 354-358 Redline Version: Figure 12 Lines 355-360

Comment Number:
3
Comment:
Conclusions: Make sure to point out that the multifrequency approach brought some modest improvement compared to that of single frequency with mu-lambda constrain [reviewer #3]..
Reply:
We have updated the conclusion to include this statement: A novel approach to retrieving the DSD using PSO has been discussed. The outlined dual-frequency dual-polarization method can provide significantly improved estimates for rainfall compared to $Z - R$ relationship estimates and offers modest improvement to retrievals utilizing relevant $\mu - \Lambda$ constraints. While the retrieval is unconstrained regarding the gamma distribution parameters, the price is the additional data needed. The authors predict that radar systems utilizing more than one frequency will continue to become more commonplace and producing the required synchronized measurements will be more feasible with teh the adoption of phased array systems. The value of dual-polarization in radars is already universally accepted. Algorithms such as the one prototyped in this work will become more valuable as radar systems produce data with this type of increased diversity.
Manuscript Update: Revision: Lines 386-388   Redline Version: Lines 387-390