

REVIEW REPORT

Review of amt-2022-92

By Christos Gatidis, Marc Schleiss, and Christine Unal

Manuscript Title – Sensitivity analysis of DSD retrievals from polarimetric radar in stratiform rain based on μ - λ relationship

GENERAL COMMENTS

The Authors evaluated the effects that different aspects/assumptions can have on the mu-lambda relations and retrieved the mu and lambda parameters from and S-band radar and compared the retrievals with a disdrometer.

The papers is well organized and the methodology and results are well described. I suggest the publication on AMT after addressing my comments.

- 1) Section 2.1. Some more information regarding disdrometer data processing are needed. For example, did the Authors apply any kind of pre-processing to disdrometer data such as the elimination of spurious drops using a fall velocity filter (see for example Tokay et al 2001)? There is a minimum number of drops in each considered rainy minute?
- 2) Section 2.2. Some more information regarding the locations of the devices are needed. For example, which is the distance between radar and disdrometer? Is the disdrometer located along the constant azimuth of the TARA? If yes (or around) which is the height of the first useful TARA bin above the disdrometer?
- 3) Section 3.1. Please note that also Adirosi et al (2016), among others, have investigated the validity of the gamma assumption to model natural DSD.
- 4) Section 3.2. It is not clear to me why the Authors used the CF. To estimate mu? Why do not estimate it with MoM as written in the previous sentence? Please clarify
- 5) I suggest to move section 3.4 before section 3.3
- 6) Section 4.1. To help the reader can the Authors briefly recall the criterion defined in Gatidis et al (2020) and adopted in the paper? Can the Author provide the percentage of DSD discarded for each event?
- 7) Section 4.2. What about the mu-lambda relations obtained considering only the "non-gamma DSD"? If (as I guess) it is similar to the one obtained with the whole dataset or considering only "gamma" DSD it means that the assumption that the gamma assumption do not influence the mu-lambda relation is strengthen. Am I correct?
- 8) Line 235: "previous section" is section 4.1 or 4.2?
- 9) Section 5.1.1. How do the Authors compute Zh and Zdr from disdrometer data? I guess electromagnetic simulation (such as T-matrix). Please specify
- 10) Section 5.1.3. I don't understand the need of performing the retrieval considering un-corrected Zh and Zdr. I suggest to eliminate this part and start with the retrieval of the DSD parameter from unbiased Zh and Zdr. This is just a suggestion. The Authors can decide to keep this part but in this case probably a justification is needed.

REFERENCE

Adirosi, E., Volpi, E., Lombardo, F., & Baldini, L. (2016). Raindrop size distribution: Fitting performance of common theoretical models. *Advances in Water Resources*, 96, 290-305.

Tokay, A., Kruger, A., & Krajewski, W. F. (2001). Comparison of drop size distribution measurements by impact and optical disdrometers. *Journal of Applied Meteorology and Climatology*, 40(11), 2083-2097.