

Response to the comments of Anonymous Referee #1

We would like to thank anonymous referee#1 for the constructive feedback on our manuscript.

Our responses to the comments are shown below.

The comments of anonymous referee #1 are shown in black. Authors' responses are shown in blue.

< Comment 1 >

You have seriously replied to all questions and comments and provided an extensive rebuttal including a thorough revision of your manuscript. I only have one remaining remark concerning the particle size distribution of rain drops. Although this is described in Marshall and Palmer (1948), in case of the Z-R relationship between radar reflectivity and rain rate, the coefficients (200 & 1.6) probably should be obtained from: Marshall, J. S., W. Hitschfeld, and K. L. S. Gunn, 1955: Advances in radar weather. Advances in Geophysics, Academic Press, New York, Vol. 2, 1–56. Note that many different coefficients for the Z-R (radar reflectivity factor - rain rate) relationship exist in the literature, some of them also for other than temperate climates, such as for tropical rain. So the use of the M-P ($Z = 200 * R^{1.6}$) relationship has its limitations for other than temperature climates, but the Z-R relationship itself can be applied in other climates preferably with appropriate coefficients for that climate. Here, you do not use the Z-R relationship, but since you are referring to the drop size distribution from Marshall and Palmer, a similar reasoning can be followed for your specific computations.

Response:

We will not refer to the Z-R relationship itself here because we do not use the Z-R relationship, but we will describe the limitation of the use of the M-P distribution and add the proposed paper to references. Therefore, we will revise L. 185 through 186 and L. 193 through 195 as follows and add the following paper to references.

L. 185 through 186

“Since the particle size distribution of raindrops is known to be related to rainfall intensity (Marshall and Palmer, 1948; Marshall et al., 1955), the extinction coefficient can be expressed using rainfall intensity as follows.”

L. 193 through 195

“Therefore, the use of the M-P distribution has limitations for other rainfall types and climates. It should be noted that when Eq. (6) is used under different rainfall types and climates conditions than those under which the M-P distribution is applied, the appropriate coefficients for other rainfall types and climates should be used.”

[The paper to add to the references]

- Marshall, J. S., Hitschfeld, W., and Gunn, K. L. S.: Advances in radar weather, Adv. Geophys., 2, 1–56, [https://doi.org/10.1016/S0065-2687\(08\)60310-6](https://doi.org/10.1016/S0065-2687(08)60310-6), 1955.