

REVIEW REPORT

Review of amt-2023-155

By Christos Gatidis, Marc Schleiss, and Christine Unal

Manuscript Title – μ - λ relationships for convective and stratiform rainfall in the Netherlands

GENERAL COMMENTS

The Authors proposed a new model to represent the μ - λ relationships. The parameters of the proposed μ - λ relationships are obtained considering 20 months of disdrometers data in the Netherlands. μ - λ relationships for stratiform and convective conditions are also obtained and compared with models in the literature. The manuscript is well written and easy to follow. I suggest the publication on Journal of Hydrology after addressing my comments.

MAIN COMMENTS

- 1) I suggest to slightly change the title in order to stress the fact that in the paper a new model is proposed to model the μ - λ relationships
- 2) In the Introduction (last sentence) it should be highlighted that a new model is proposed to model the μ - λ relationships and the advantages of this model with respect to the classical ones
- 3) Section 3.1 To help the reader please add which moments the Authors use to fit the gamma DSD. Furthermore, recent works have criticized Method of Moments for producing biased parameters, whereas the maximum likelihood method proves to perform better (see e.g. Smith and Kliche, 2005 ; Smith et al., 2009 ; Kliche et al., 2008). Please provide some comments/consideration on this important aspect.
- 4) Equation 13: can the Authors write the equation of M_j and M_{j-1} that lead to the right hand side?
- 5) Section 3.3: please add more information on the methodology used to classify stratiform and convective period. The classification is done for each minute or on a longer time period? How the lighting information are used for the classification?
- 6) Section 4.1: please insert the data quality methodology in the previous section
- 7) Section 4.1: Is it possible to know if the discarded DSDs correspond mostly to convective or stratiform period? It would be interesting to know some characteristic of the discarded DSDs to understand when the two devices differ more
- 8) Section 5, point 1): to check this conclusion two μ - λ relationships can be obtained (one for each disdrometer) and then compared.

REFERENCES

Smith, P.L., Kliche, V.D., 2005. The bias in moment estimators for parameters of drop size distribution functions: sampling from exponential distributions. *J. Appl. Meteor.* 44, 1195–1205. <http://dx.doi.org/10.1175/JAM2258.1> .

Smith, P.L., Kliche, D.V., Johnson, R.W., 2009. The bias and error in moment estimators for parameters of drop size distribution functions: sampling from gamma distributions. *J. Appl. Meteorol. Clim.* 48, 2118–2126. <http://dx.doi.org/10.1175/2009JAMC2114.1> .

Kliche, D.V., Smith, P.L, Johnson, R.W., 2008. L-moment estimators as applied to gamma drop size distributions. *J. Appl. Meteorol. Clim .* 47, 3117–3130. [http://dx. doi.org/10.1175/2008JAMC1936.1](http://dx.doi.org/10.1175/2008JAMC1936.1) .