Comment 1

Regarding the response to my first comment, the authors estimate the effect of the truncation of the raindrop size distribution as:

$Dm,jwd\ /\ Dm,mod = Q(1+\mu+4, \lambda Dcut)\ /\ Q(1+\mu+3, \lambda Dcut)$

However, it should be

$Dm,jwd\ /\ Dm,mod = \lambda mod\ /\ \lambda jwd * Q(1+\mu+4, \lambda Dcut) / Q(1+\mu+3, \lambda Dcut)$

because λ is a function of the zero-order moment and is affected by the truncation

Author's response

We thank the reviewer for the insightful observation regarding the correct formulation of the impact of truncation on the mass-weighted mean diameter, Dm. We agree that λ is a function of the zeroth-order moment and is affected by truncation, and thus, a general expression comparing truncated and full distributions should account for the change in λ. However, in our specific implementation, we aimed to quantify the effect of truncation on Dm , as calculated by the JWD disdrometer, which is unable to observe drops below a certain diameter (e.g., 0.3 mm). In practice, these instruments use the same model parameters (i.e., λ and μ derived assuming a complete distribution) and apply them to a truncated drop size spectrum.

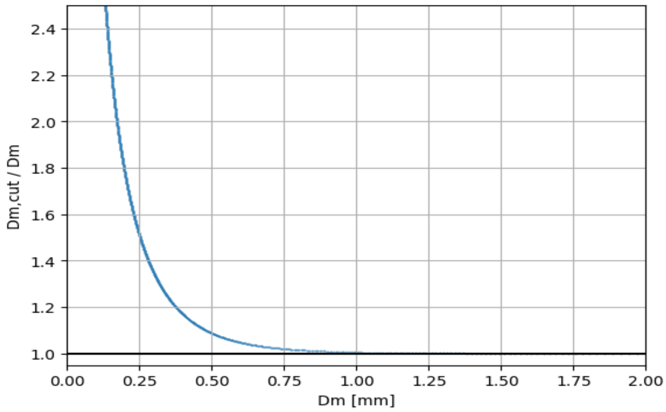
Therefore, what we aimed to assess is:

1. Calculate the true model-derived mass-weighted mean diameter Dm_{model} using the full gamma distribution (from 0 to ∞) with fixed λ and μ.

2. Then, using the same λ and μ, calculate the truncated Dm_{cut}, by integrating only over $D>D_{cut}$, mimicking what a disdrometer would measure.

3. Finally, we compute the ratio $Dm_{cut}/Dm_{model,}$ which tells us how much the mass-weighted mean diameter is biased by truncation. This ratio can then be applied to model output to interpret what a truncated observation would report.

Comparing λ values directly between truncated and full distributions would require inversion and iteration, as λ depends on total concentration, which is affected by truncation. In light of this, we believe our current approach — fixing λ and μ and assessing the shift in Dm due to truncation — is appropriate for evaluating instrument bias (that is, simply reporting total mass for D>Dcut/total number for D>Dcut) while holding the underlying DSD fixed. We welcome further clarification from the reviewer if there are additional considerations we may have overlooked, particularly regarding an alternative approach to relate the change in λ itself through truncation.

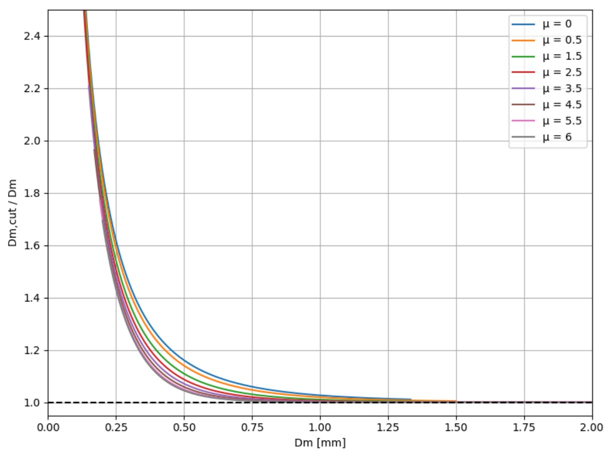


Comment 2

Author's Response

2) We thank the reviewer for this important suggestion. As correctly noted, the original figure in our response showed the results for a fixed shape parameter μ=2.5.

In response to the comment, we have now extended the analysis to explore the sensitivity of the truncation effect to variations in μ, covering a realistic observed range of μ=0 to 6. The updated figure illustrates the ratio Dm_{cut}/Dm as a function of Dm for each value of μ.



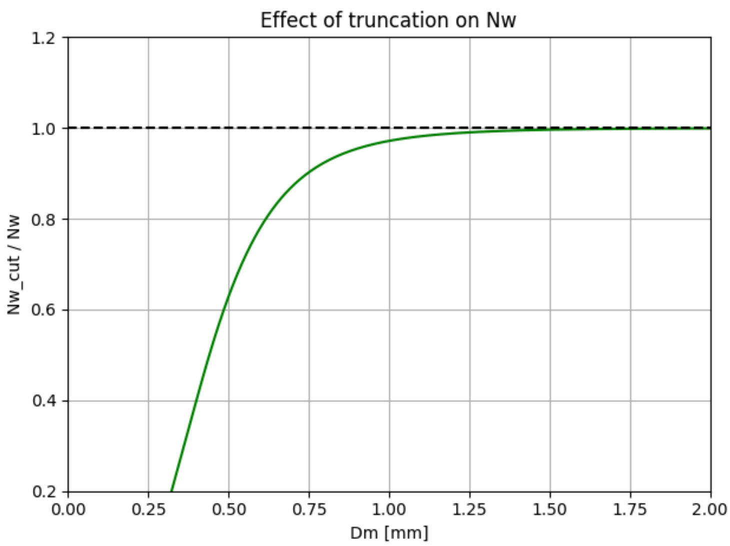
The results indicate that while the overall pattern of overestimation of Dm due to truncation remains consistent, the magnitude of this bias is dependent on the value of μ. Specifically, lower μ values (broader distributions) tend to show larger truncation-induced biases, as they contain a greater proportion of small drops that are excluded below the disdrometer threshold.

Comment 3

The effect of the truncation on Nw should also be assessed.

Author's Response

3) We thank the reviewer for pointing out the importance of evaluating the effect of truncation on the normalized intercept parameter Nw. To address this, we have carried out a numerical calculation of Nw using the gamma drop size distribution with a fixed concentration and shape parameter (μ=2.5). We compute Nw from the full DSD, and again from a truncated version of the same distribution, excluding drops below Dcut = 0.3 mm, simulating a typical disdrometer threshold. We then calculate and plot the ratio Nw_{cut}/Nw as a function of the true Dm. The results show that the truncation leads to systematic underestimation of Nw, particularly in cases with smaller mean drop sizes (Dm<0.5 mm), where the bias can exceed 80%. The analysis confirms that truncation effects also affect the estimation of Nw, especially for narrow and smaller drop distributions.



Comment 4

The influence of the truncation of raindrop diameter is an important issue that affects the conclusions of this paper. Thus, these discussions should be reflected in the main text.

Author's response

Thanks for the suggestion, and we made an additional brief section about the truncation effect in the manuscript.

Changes in Manuscript

A brief paragraph about the truncation effect of JWD and how it affects our analysis is added in the manuscript's main text, and a detailed explanation about this is added as Appendix 3 in the manuscript