The authors thank the editor for his helpful comments that improved the quality of the manuscript

Comments from editor and answers from the authors

All comments have been addressed and fixed. Here we only mention those that require further explanation.

The figure archive was uploaded apparently as the electronic supplement file (please make sure that the editorial office is informed that it is not meant to be published as electronic supplement).

Answer: We will make sure that the editorial office is informed about this via email. Thanks for noticing this.

Page 1 / line 21-22: suggest rephrasing the reference to Marshall and Palmer - certainly this is a seminal work, yet not a "first attempt at characterizing drop spectra" (cf., e.g., Houghton 1932, "The Size and Size Distribution of Fog Particles", https://doi.org/10.1063/1.1745072; Schumann 1940, "Theoretical aspects of the size distribution of fog particles", https://doi.org/10.1002/qj.49706628508). Please clarify in which aspects Marshall and Palmer's work was pioneering.

Answer: Since that is one of the opening statements, a brief explanation have been added about the pioneering aspects of the work of Marshall and Palmer (1948). Marshall and Palmer (1948) were apparently the first to describe the size distributions of raindrops in space, as opposed to those distributions over a surface. The surface distributions of precipitation particle sizes are still of interest and information about the spatial distributions can be computed from surface data. Marshall and Palmer, however, were concerned with the size distributions of the drops in the atmosphere aloft where they could be viewed by radar (Smith, 1982).

Page 1 / line 26-27: not even a suggestion, just sharing a recent find: Andersson 2021, "Mechanisms for log normal concentration distributions in the environment", https://doi.org/10.1038/s41598-021-96010-6

Answer: Interesting work, we will definitely check it out. Thank you!

Page 2 / lines 68-71: let me again raise the issue of referring to particle-resolved methods as more costly than bin. The referenced work of Grabowski (2020) (i) is a condensation-only study, (ii) it employs a serial implementation of the particle-based microphysics and (iii) it focuses on a small-scale cloud-chamber experiment setup. It is thus not representative for at least these three reasons. At this point, I suggest to remove the discussion of computational cost of particle-

based methods from the paper, as it is not directly relevant to presented material. [If intending to cover it however, please elaborate why, even for single attribute, spatial transport of particles (trivial ODEs) would be costlier than solving transport of bin-microphysics scalar fields (advection PDEs); why a Monte-Carlo coalescence algorithm with linear scaling would.

Answer: We eliminated the discussion related to computational cost of particle-based methods, since it is not relevant to the manuscript.

Page 2 / line 38-40: "the KCE has no analytical solution" - it has for some kernels; "numerical schemes, which are very diffusive by nature" - in atmospheric modelling context likely so, but in principle it depends on the grid choice, right? Suggest rephrasing.

Answer: Indeed, it depends on the grid choice and numerical method used to solve it. This has been noted in the manuscript.

Page 3 / line 81: I admit, I don't understand the "However, this integration can be made only once

for all parameters at each time step". Suggest clarifying.

Answer: The sentence was misleading and prone to confusion. Also, it did not contribute much to the explanation of the parameterization. Thus, it has been eliminated from the manuscript.

Page 10 / Table 1: please clarify that \mu is given in natural logarithm of metres, right? (it would be clearer to give exp(\nu) geometric mean values in micrometres)

Page 16 / Table 4: ditto

Answer: The units of μ has been added to the manuscript. The units are $\ln cm$, since the lognormal distribution works in *cm*. Also, as μ is a parameter of the distribution function, we prefer to keep it in units of $\ln cm$, to avoid confusion about which values where actually used in the model.

Page 20 / Figure 8: I read carefully your answer, yet it only assures me that (as in the case of Fig. 7, the vertical axis unit label should include "ln(r^{-1})" or alike. Note that in aerosol studies, base-10 logarithms are commonly used, and it is perhaps worth to remind readers of the logarithm base as well.

Answer: Figure 8 y-label has been changed accordingly.

References

Marshall, J. S. and Palmer, W. M. K.: The distribution of raindrops with size, J. Meteorol., 5(4), 165–166, doi:10.1175/1520-0469(1948)005<0165:TDORWS>2.0.CO;2, 1948.

Smith, P. L.: On the graphical presentation of raindrop size data, Atmosphere-Ocean, 20(1), 4–16, doi:10.1080/07055900.1982.9649124, 1982.