

Author Response

Revised Submission: egosphere-2025-4222 - Curve fitting algorithm for multimodal particle size distributions – a theoretical basis

RC2: The work done by Rapp et al. is presented clearly and coherently and I have no major issues with the writing itself or the structure of the manuscript. However, I cannot recommend its publication as a research paper and would recommend its resubmission as a technical note. While the method presented in the manuscript could be of use to some, it is not novel enough for a full research article and the study itself presents little new additional research. In addition, it is only available for R, which undoubtedly limits the number of potential users.

The authors thank RC2 for their careful review of the manuscript and helpful comments. We appreciate the suggestion that the work may be more suitable as a technical note. However, as this article type is no longer offered by AMT, we believe the latest revision is the most appropriate format in presenting a method focused manuscript and its evaluation. Regarding user limitations to R, a primary focus of this work was open access and accessibility (see supplement) such that it could be readily implemented into other programming languages.

Other comments:

1. Fig. 1 and 2: the fit seems to be poorer for smaller diameters. The limitations imposed by size or low concentrations and their implications on the interpretation of the fitted modes could be discussed.

While the size constraint was already included in section 4.3, we included a brief description on low concentration limitations. This is further supported in the comparison to other fitting methods as suggested in Comment 2.

2. No comparison with other mode fitting methods is presented. Some comparative results would increase the value of the study.

We thank the reviewer for this constructive comment and have included a comparison (Sect. 3.4) with the DO-FIT model which was frequently referenced in the manuscript (Hussein et al., 2005). We also adjusted locations throughout the manuscript referencing this inclusion.

Both models were run in a tri-modal configuration on the entire SPL dataset as described within the manuscript. This comparison includes a comparison of accuracy metrics (Table 2), fitting properties across lognormal spaces (Figure 7), and prediction error comparison (Figure 8).

3. The study is focused on introducing a R-based curve fitting algorithm for modal aerosol size distributions. The paper would be more useful were some actual examples of using the algorithm given. In addition, detailed description of the outputs of the algorithm should be provided.

Examples and descriptions of the implementation of the algorithm were included in the supplement which was designed as a user-manual. We have added a sentence at the end of the algorithm description section (Sect. 2.7) directing readers to the supplement.

References

Hussein, T., Dal Maso, M., Petäjä, T., Koponen, I. K., Paatero, P., Aalto, P. P., Hämeri, K., and Kulmala, M.: Evaluation of an automatic algorithm for fitting the particle number size distributions, *Boreal Environ. Res.*, 10, 337, 2005.

