

Author Response

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

RC1: The work is done and presented well. There are no major questions about the quality of the work. The main question this reviewer has is "why"? The manuscript is about fitting functions to a multimodal particle size distribution. This is basic data analysis and all major scientific software suites include this capability. An argument was made that the presented work simplifies the process so that the user does not have to learn how to find the peaks (which in itself could be problematic since now there's a black box doing the analysis). However, the code is written in R (using existing R packages for analysis - so again, where's the novelty?) which limits its usefulness to those using R (as opposed to e.g., Python or Matlab). As such, there is little scientific merit to be reviewed here. In conclusion, this manuscript does not offer anything novel to meet the standards of AMT and qualify as a full research paper. The manuscript could be re-submitted as a technical note or the focus could be shifted to analyzing the data from SPL using the R functions described.

The authors thank RC1 for their careful review of the manuscript and for their constructive comments. While several major scientific software packages include capabilities for fitting multimodal particle size distributions (MPSDs), we are not aware of a readily accessible and flexible implementation that can accurately characterize the wide range of ambient and laboratory measurements considered in this work. One of the primary motivations for developing this algorithm was the lack of an openly available and broadly applicable MPSD fitting framework identified in the literature. We agree that automated peak identification is an obstacle for users to develop experience with manual peak selection. However, for large datasets, manual analysis is impractical, as previously discussed by Mäkelä et al. (2000).

R was selected as the implementation platform because of its strong statistical capabilities and use within the aerosol sciences community. In keeping with the open-access objectives of this work (as shown in the supplement), the algorithm has been designed to be transparent and readily adaptable to other programming environments, such as Python or MATLAB as mentioned. We further argue that this open-access framework addresses accessibility limitations commonly associated with other instruments or models such as IGOR or IDL.

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.

References

Mäkelä, J. M., Koponen, I. K., Aalto, P., and Kulmala, M.: ONE-YEAR DATA OF SUBMICRON SIZE MODES OF TROPOSPHERIC BACKGROUND AEROSOL IN SOUTHERN FINLAND, *Journal of Aerosol Science*, 31, 595–611, [https://doi.org/10.1016/S0021-8502\(99\)00545-5](https://doi.org/10.1016/S0021-8502(99)00545-5), 2000.