



Supplement of

Nanoparticle ranking analysis: determining new particle formation (NPF) event occurrence and intensity based on the concentration spectrum of formed (sub-5 nm) particles

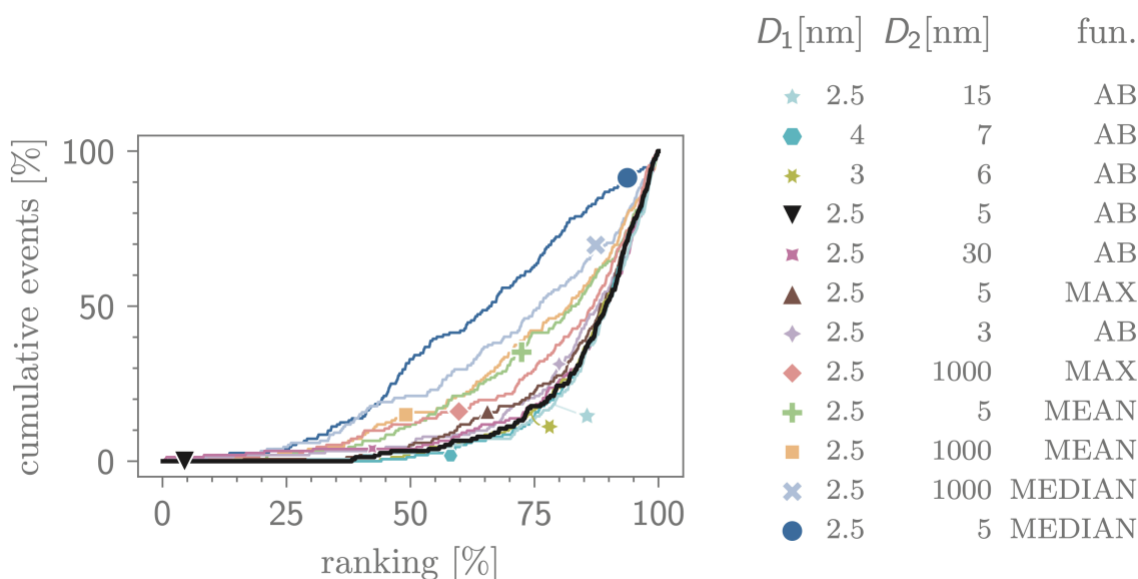
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1 Sensitivity analysis of 12 different ways of applying the nanoparticle ranking and their comparison to classical event classification.

5 In fig. S1, we compare the cumulative sum of events (Ia, Ib, II) against 12 different ways of obtaining the ranking with varying particle boundaries and functions to obtain the single day metric. The assumption here is that classical classification (Dal Maso et al., 2005) is the ground truth. The effectiveness of a set of parameters is measured by the distribution of events across the ranking spectrum, with the ideal method showing fewer events at lower rankings and a concentration of events at higher rankings. The options in the first four rows are strong candidates. The fifth row's
 10 method, which considers particles up to 30nm in diameter, is less ideal, as it begins to register events at very low-ranking values (around 15%). The sixth option, which takes the daily maximum of 2.5-5nm diameter particles, is also not ideal as it shows a considerable number of events just above the 50% ranking value.



15 **Figure S1.** Shows the cumulative count of events (Ia, Ib, II; Dal Maso et al., 2005) organized by their ranking values, which are derived from particle number size distribution using various ranking parameters (D_1, D_2 and fun.). On the y-axis, the cumulative count of these events is displayed, while the x-axis represents the ranking as a percentage. Each curve on the graph corresponds to a different set of parameters used in the ranking. These parameters are detailed in the accompanying table that shows the initial and final diameters used for number concentrations (first and second columns) and the function used to calculate the daily intensity value (third column). These functions include AB, which subtracts the background window average from the active window's maximum value, and MAX, MEAN, and MEDIAN, which use the daily maximum, mean, or median function, respectively. The fourth row (lilac) indicates the recommended parameters for Nano
 20 Ranking.

References

- 25 Dal Maso, M., Kulmala, M., Riipinen, I., Wagner, R., Hussein, T., Aalto, P. P., and Lehtinen, K.: Formation and growth of fresh atmospheric aerosols: eight years of aerosol size distribution data from SMEAR II, Hyytiälä, Finland, *Boreal Environment Research*, 10, 323–336, 2005.