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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Variations in tropospheric submicron particle size distributions across the European continent 2008–2009" *by* D. C. S. Beddows et al.

Anonymous Referee #2

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General comments

The present paper illustrates a very interesting approach of how to generalize and summarize aerosol spectra in Europe and addresses relevant scientific questions within the scope of ACP. The authors used a huge dataset that is worth to be published. The results are very interesting and – in my opinion – of a fundamental kind in the field of aerosol research. The abstract and title are clear and sufficiently describe the content of the manuscript. The scientific results and conclusions presented in a clear and well-structured way. However, concerning the methods I have some few brief comments presented under "specific comments". The manuscript represent a substantial contri-

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bution to scientific progress within the scope of Atmospheric Chemistry and Physics. After revising I therefore suggest this paper for publishing in ACPD.

Specific comments - I was wondering about the size bins. Is it 121 size bins and 10 min resolution or 54 bins and 1h resolution ? It says that EUSAAR measures usually every 10min. - Are you finally using data between 1 -1000nm or only 20 – 300 nm ? The figures show 20 to 500 nm. Please specify ! Both aspects are not clearly described in section “methodology”.

- I like the approach of clustering measurements of all 24 sites at once and not each site in specific. Nevertheless, I wonder about the number of 9 Clusters being representative at all sites ? I assume that many sites would show a smaller number of significant clusters but they are “forced” to find more, which means that the pre-setting of 9 clusters splits up quite similar clusters into two or more. Doesn’t this approach too much generalize the possible patterns that can be identified by clustering ? - On a first view it looks like a “miracle” that your clusters follow the given paths in Fig. 5 and 6. Anyway, this constitutes a fundamental finding in the field of identifying general patterns in particle size distribution and this success demonstrated that the 9 cluster attempt was right. - It would be interesting when “polluted” clusters from urban particle measurements are included. - Fig. 8: what is meant by: “by circles and the progress plotted by the coloured lines” ? I cannot find circles or colored lines except the dotted anywhere. - Please explain the mode fitting procedure in a few sentences.

- I wonder how to exclude the influence of point emission sources e.g. industry or traffic hot spots in order to derive even better clustering results in the future.

Technical corrections

Spelling: Page 8, Line 12: “every” Check the spelling of names in the references and in the text. I suggest to include a colorbar for Fig. 4 and to rotate the figure (time on the x-axis) as this this is the usual way. Fig.8: Very complex, but interesting. I recommend to use a standardized scale for y-axis in c) and e) and to increase quality of these two

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panels.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 31197, 2013.

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