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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Size distributions of non-volatile particle residuals (D_p<800 nm) at a rural site in Germany and relation to airmass origin" *by* C. Engler et al.

Anonymous Referee #2

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General Comments. The paper describes a one-year record of aerosol size distribution measurements from the Melpitz atmospheric research station in rural Eastern Germany, operated by the Institute of Tropospheric Research, Leipzig. A novelty of the data set is that alternate size distributions are of the non-volatile aerosol residual after thermal conditioning at 300 degrees C. Shrinking factors are derived from the 'ambient' and non-volatile core size distributions and these together with the size distributions are analysed in terms of air mass origin, both by standard weather analysis, and a cluster analysis of back trajectories with both 7 and 11 separate trajectory classes. The size distribution data per se are of interest while the additional data on the non-volatile component of the aerosol will provide a valuable data set for model validation studies, once

the issue of the effect of the thermal conditioning on particle number concentrations has been addressed.

Specific Comments 1. The average ratio between the ambient particles and the non-volatile cores downstream is given as 1.16 +/- 0.16, indicating that in most of the cases the thermally conditioned sample has a higher total number population than the ambient one. Whether this is due to particle production as a result of the thermal conditioning or is a measurement uncertainty needs to be expanded upon and discussed in much greater detail, as the subsequent analysis is entirely dependent upon there not being significant new particle production in the measurement of the non-volatile fraction. The authors could provide some analysis of the measurement uncertainty, filter the data set to remove those cases where particle production is obvious, and repeat the analysis. 2. Following on from this, the cases where the thermal conditioning appears to produce the largest increase in particle concentrations are the clusters with Back trajectories originating from the N. Sea which the authors identify as having significant contributions to the particles from secondary origins. This would point to possible particle formation from the volatilised fraction. 3. The authors should expand on how the summation method works in the cases where the ambient size distribution is uni-modal and the non-volatile size distribution is bi-modal. 4. It would also be helpful and informative if the authors were to adapt the summation method to identify the general size intervals where the increase in number concentration is occurring as this would also provide pointers to the likely mechanisms. 5. I agree with the first reviewer that the authors should provide quantitative key aerosol parameters, in order to better understand and compare the data with other observations

Technical Comments 1. P5508 1st sentence. EC/OC analysers measure EC not black carbon, the confusion between these two terms should be avoided. 2. If I understand correctly the particles size distributions up stream of the thermal conditioning are at 5%RH, can you clarify your definition of 'ambient' accordingly.

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6, S2310–S2312, 2006

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 5505, 2006.

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6, S2310–S2312, 2006

Interactive Comment

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