Atmospheric Chemistry and Physics Discussions

Interactive comment on "Particle number size distributions in urban air before and after volatilisation" *by* W. Birmili et al.

W. Birmili et al.

birmili@tropos.de

When reading the paper it is not really clear, what is new...

Reply: It is true that measurements using mobility spectrometers and even in conjunction with thermodenuders are not entirely new. In our opinion, the major novelty of the present article is the systematic analysis of mobility spectrometer/thermodenuder data for urban background conditions, and its link to aerosol absorption data. The asset of a long time series allows to confirm, back-up (or even challenge) previous knowledge and hypotheses on a solid statistical basis.

The authors argue in the introduction that the data are of importance because they can be used in the KORA platform; however, in this manuscript no further relation to this

platform and the use of the data for the purpose of KORA is made.

Reply: Epidemiological studies within KORA on the short-term response of citizens in Augsburg with respect to air pollutants are underway. Long time series (several years) of health endpoints (respiratory and cardiovascular symptoms) on the one side, and various environmental variables on the other side will be needed to provide statistically relevant results. Results of epidemiological studies within KORA are planned to appear during the next few years, and these studies will necessarily cite the present article. It seems logical that this (purely) experimental article will appear first, and epidemiological results later.

In the description of the experimental setup aethalometer and TEOM are also mentioned, however, no data are shown.

Reply: Aethalometer data are used in Figure 10. TEOM data are only briefly mentioned and were not further discussed, since they have been treated already within the framework of a density determination elsewhere (Pitz et al., 2008a,b). If you have a suggestion for the concrete use of PM10 and PM2.5 data whithin this article, please let us know.

Page 8, bottom: by assuming a certain density, aerodynamic diameters are converted to mobility diameters, not to electromobility diameters

Reply: Thank you, this will be corrected.

Page 16: I agree that the co-variations over 7 days clearly indicate anthropogenic contributions; however, this cannot be used as a measure for the intensity of anthropogenic contributions.

Reply: We agree in that the co-variations over 7 days cannot be compared quantitatively, for instance, to the co-variations over 24 hours. We have therefore decided to remove the corresponding conclusions.

Which experimental results indicate that the 10 to 30 nm particles originate overwhelm-

ingly from photochemical processes?

Reply: Has there been a misunderstanding? In the article we write: "In conclusion, the particle number concentration between **3 and 10 nm** seems to originate overwhelmingly from photochemical processes, that between **10 to 30 nm** mainly from the exhaust of motor vehicles." These conclusions are drawn from Figure 7, which illustrates the co-variations of number concentration at a given diameter over different time periods. Particles between 10 and 30 nm show a maximum in the weekly periodical (i.e. anthropogenically derived) component. In combination with experimental roadside size distributions that report a maximum in that very size range as well we conclude that particles between 10 and 30 nm derive from traffic. Particles below 10 nm lose this weekly periodical component, and fall back to the daily periodical component. The main meteorological variable changing on a daily scale is solar radiation. The size range below 10 nm is also consistent with many previous observations of new particle formation. Nevertheless we agree that the quantitative relative contributions of photochemical processes and traffic can be debated for the size interval below 10 nm. As a solution we propose to refine the discussion of these results in the article in line with the arguments above. We will also have an additional look at the correlations of particle number concentrations with solar radiation data (not included yet in the article) to support the conclusions derived. As the latter analysis will require some time, it will be included in the revised version of the article.

Fig. 13: The assignment of trajectory number to color in the graph is not clear for all trajectories; I did not find Trajectory 8.

Reply: In fact, the mean trajectory for cluster 8 is so short that it disappears in the bundle of trajectories shown in Fig. 13. We will add a remark in the caption of this Figure.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 9171, 2009.