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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Size-segregated mass distributions of aerosols over Eastern Mediterranean: seasonal variability and comparison with AERONET columnar size-distributions" *by* E. Gerasopoulos et al.

E. Gerasopoulos et al.

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Response to Anonymous Referee #2

We would like to thank the reviewer for his insightful comments that have really helped us improve this final version. His suggestions have been taken into account and all raised issues are answered one by one.

1. Manuscript was checked for spelling and grammar.

2. Rondriquez has been changed to Rodriguez throughout the text.

3. As suggested by the reviewer we have rephrased the definition of the two standard deviations as follows: “Two types of variability are introduced in Fig. 3; the standard deviation of all samples within the two year sampling period (error bars), and the standard deviation between the monthly averages of each year (dotted line), indicating the sample-by-sample and the month-by-month variability, respectively.” The Fig. 3 caption has been also changed accordingly.

4. The sharp minimum at 1 micrometer represents the correlation coefficient between the 1 micrometer cutoff stage and the one above (1.66 micrometers). Since each value is attributed to the lower cutoff, the minimum has to do with the fact that the stages from 1.66 micrometers and above have different seasonal cycles compared with those below 1 micrometer. For better interpreting the significance of the correlations the 95 and 99% confidence levels have been also included in Fig. 4.

5. We would like to thank the reviewer for providing another possible interpretation for the lack of Aitken 1 particles in spring, not disregarding of course that this mode is related to rather low measured masses with therefore enhanced uncertainty. So we have added the following sentence in pg 11. “A reason for the absence of the “Aitken 1” mode in spring could be that such fine particles can stick rapidly to the numerous coarse dust particles that are present during this season.”

6. Again we would thank the reviewer for his remark. The discussion of the Accumulation 2 mode and its possible link to cloud processing has been expanded according to his comment as follows: “Growth of smaller particles by oxidation is probably not the mechanism that creates these particles. On the other hand, it is possible that CCN in drops that grow by coalescence and then evaporate can lead to the release of larger particles into the atmosphere”

7. The reviewer most probably refers to figure 9 and not to figure 7. AERONET values are always lower compared to ground based measurements only for the fine mode and there are several possible explanations for that fact. As fine particles are related mainly

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to anthropogenic sources found near surface, it might be that AERONET perceives a reduced, integrated, mean diameter due to the vertical distribution of aerosols. This is strengthened by the fact that in winter and spring, when pollution is low, the difference shifts to the lower values of the distribution, while in summer and autumn, when pollution peaks, the difference shifts to higher values. Moreover, the increased water vapor mixing ratios into the mixing layer results to hygroscopic growth of certain particles that could partly explain the observed difference of the fine mode diameters.

8. During winter the coverage of AERONET is quite limited and comparison between AERONET and ground base measurements is possible only during clear days and thus periods with low RH. We would like also to mention that in summer RH is still high due to the persistence of northerlies. Thus, it seems that the difference in aerosol loadings with seasons and in particular the relatively cleaner conditions in winter is much more significant than the RH changes, since there are not actually many particles to grow even if RH is higher. Finally concerning the boundary layer, measurements at Finokalia have shown that the difference between summer and winter values of the BL is not significant at the 99% confidence level (Gerasopoulos et al., 2006).

9. Figure 10 and the related discussion has been changed based on comment 10 of reviewer #1.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 469, 2007.