

Interactive comment on “Morphological, chemical and optical absorbing characterization of aerosols in the urban atmosphere of Valladolid” by S. Mogo et al.

Anonymous Referee #2

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The paper discusses scientific questions that are relevant to the scope of ACP. While the concepts are not novel, the question of isolating the relationships between the chemical, optical and physical properties is important and requires continuing work. However, most of the findings in this paper are not substantial enough to warrant publication. General critiques

Usually one of two approaches is taken in ambient aerosol measurements. First, one can measure for an extended time in the hopes of representing some aerosol climatology for a specific region. This paper has 16 days of measurements taken sporadically

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between December and June, covering variable amounts of the day, and does not qualify as a climatology paper. Second, one can measure for a short time, but search for the relationships between measurements through intensive data analysis. This paper doesn't accomplish this either; it merely presents averages and ranges for the short data collection period.

The finding that aerosol concentrations or properties are variable is hardly new. The paper contains some interesting measurements, but much more analysis is needed before it can be a useful contribution to the literature.

Authors have cited mostly studies on climate modeling as a justification for their work. However, the work presented here does not provide information for any of these studies, nor reduce the uncertainties that the authors discuss. It would be much more appropriate to discuss papers detailing measurements (for example, those in Leipzig, Germany; K-Puszta, Hungary; Po Valley, Italy) for comparison. Other SEM studies, such as those of Anderson or Posfai should also be cited.

Technical comments

Page 3924, line 19, identification of sources. If there is no emission inventory or even an estimate, I suggest rewording: "urban aerosol _probably_ corresponds"

Page 3927, line 17. "With a system analogous to our, it was determined that 9% of the scattering is measured as absorption." That is true, but it was also determined that the integrating plate over-estimated the absorption by about 20%. This overestimation depends on the optical setup and the filter. It appears as if these values are uncorrected, that is, results of an uncalibrated instrument are reported here. This should be made clear.

Pages 3928-3929, aerosol classification. The report on aerosol types and shapes observed is useful. In particular, Fig 11 is probably the most important information given in this work. Some comments on this presentation: - How many particles were

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analyzed for each stage? This is very important; authors claim in the conclusions that this method is a good way to characterize ambient aerosol, but most people who have used SEM admit that it is very time-consuming work! - Authors should point out that SEM will lose the volatile particles and thus, their results in Fig 11 represent only composition of non-volatile particles, not all particles. - The use of separate text sections for each aerosol size, and figures with X-ray spectra for each type of particle, is probably not necessary. These figures could be combined into one or two figures showing the spectra and shapes of these particles.

Page 3930, lines 11-23. This long introduction is not necessary. While the statements are true, the results presented in this paper do not shed light on this topic.

Page 3930, line 24. Figures 12 and 13 do not represent both internal and external mixtures. It looks like all the particles are internally mixed.

Page 3931, lines 1-4. Please discuss the broader applicability of these measurements. Authors state that “this kind of atmosphere is not comparable to other towns in center Europe.” Is Valladolid different from every other town? If so, why and how? If all small towns are different from each other, is it required to make such measurements in each town throughout Europe? I agree that there are not many measurements from small towns in central Spain, so these measurements may provide worthwhile data. However, they need to be placed in context. For example, how do they compare with the background, but continentally-influenced aerosol observed in ACE-2?

Page 3931, line 10. Figure 14 should not be called an evolution, but rather a time variation. Evolution is applied to a situation where one air parcel changes through reaction or other mechanisms.

Page 3931, lines 25-29. Are you saying that you believe the aerosol absorption coefficient to be constant, and that the decrease is merely observed because of the errors?

Page 3932, paragraph beginning line 3 (mass concentrations). Why is this discussion

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included under light absorption coefficients? It seems in the wrong place.

Page 3932, paragraph beginning line 9. Certainly more analysis can be done to support this statement. What is the authors' hypothesized explanation? Although the authors have made several measurements, they are never truly synthesized into a coherent picture, and this is one of the main weaknesses of the paper. Only vague discussions appear, even when the data could be further analyzed to support or deny hypotheses.

With regard to this statement, it is not given that absorption increases if C/F decreases. For example, an urban area whose emissions dominate the fine aerosol might show nearly constant absorption coefficient (in the idealized case). When there is influx of dust, C/F would increase but absorption would remain the same or higher. Only the normalized absorption per mass is expected to decrease.

Page 3932, paragraph beginning line 12. This statement does not make sense, and also, one cannot say that black carbon particles were the main component of small particles since all the non-volatile material is lost under SEM.

Page 3933, general. The conclusions section is poorly structured. Most of the statements here are not supported.

Page 3933, paragraph beginning line 6. No evidence is given for this statement. It repeats a speculation present in the literature, which is likely true, but this paper does not add confirming evidence.

Page 3933, paragraph beginning line 15. This is not a conclusion, but a method statement. Authors have used SEM/EDX to characterize aerosol and so have others. A conclusion would be a statement about SEM/EDX results.

Page 3933, para beginning line 20. It is not necessary to say what one expects from future analysis. This statement may or may not prove to be true.

Page 3933, para beginning line 24. This statement is not necessary either.

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Comment

Editorial comments The writing quality is generally poor. Extensive editing should be undertaken. Only a few comments will be provided here, as examples. This reviewer is sympathetic to the difficulty of writing in a non-native language. However, major grammatical errors should not appear, technical terms should be used correctly, and authors should make sure they understand the longest words before they are used (otherwise, choose a simpler one).

Some examples: Page 3922. Line 10 “Emphasize” should be “emphasis” Page 3922. Line 21, “where studies of atmospheric contamination and air quality attained its greatest exponent” is not comprehensible. Page 3922. Line 23, “originate on climate and climate change scenarios” is not proper language. Page 3923. Examples of poor language: “atmospheric aerosols can behavior as” “the greater absorbent of solar radiation” etc.

I won’t continue page by page because such major editing should not fall to the reviewer.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 3921, 2005.

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