

Interactive comment on “Optical properties, morphology and elemental chemical composition of atmospheric particles at T1 supersite on MILAGRO campaign” by G. Carabali et al.

Anonymous Referee #1

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General Comments. This paper presents a study on aerosols carried out on a site at the northern neighborhood of Mexico City, during the MILAGRO campaign. Data from two different days are reported; one (March 15) dominated by local emissions, and another (March 19) dominated by aerosols carried out by the wind from Mexico City. Simultaneous measurements of absorption and scattering coefficients, as well as particle concentration, are carried out. Aerosols are sampled using a transmission electron microscope (TEM). The morphology of the sampled aerosols is then studied by measuring the border-based fractal dimension. The smaller particles seem to present a somewhat more irregular shape than the big particles which are more compact (and more spherical), effect that the authors attribute to aerosol aging and

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secondary aerosol formation. The elemental composition of some of the particles is analyzed using dispersive X-ray spectroscopy. The aerosols sampled on March 19 (dominated by Mexico City emissions) are observed to be composed mostly of carbon, while those due mostly to local emissions contain also other elements, such as Fe and Co. I consider this paper to be a valuable and interesting contribution to the study of the physical and chemical properties of urban atmospheric aerosols. The morphology study is of special interest since there is not much information on it in the literature. For many of the hypothesis discussed in the paper, the evidence is not conclusive and further studies are needed. However, this paper is an important step forward in that direction. There are some technical problems in the paper that should be taken care of. All figures (especially Figures 1, 3, 5 and 6) have a low resolution. On Figure 1, for example, it is not so easy to take apart the symbols for the two different days considered. Some work should be done to improve that. Also there are some problems in the use of the English language (in all the paper, but especially on section 3.3). We give some examples in the “technical corrections” section of this review, but the authors should re-read the whole paper and improve the language aspect of it. Specific Comments. (1) On section 2.2 (page 5, line 18) it is mentioned that the aerosol morphology was quantitatively studied by calculating the border-line fractal dimension. However the technical method used in order to do this is not described. While a reference is mentioned further below, a brief description of the method should be in order. (2) On Figure 1 and the associated comments on section 3.1 (page 6, line 12): March 19 looks basically as the authors state (that is, winds blowing from the south). However, the case of March 15 seems more controversial. They may be technically right saying that the wind prevails (is most frequently from) the north, but they should probably mention that there are many periods of southerlies, westerlies, and easterlies. In terms of the relative transport of pollution from Mexico City, it probably doesn't matter though. (3) Table 1 shows average values for the absorption and scattering coefficients at T1 and two other places. However, it is not said what sort of average is considered. Is it for only a specific day (and what day specifically?) or considers diurnal data? Is this

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a 24-hour average? (4) On section 3.3, page 10, lines 9-11, there is a discussion on the histograms of Figure 5 for atmospheric particles in the 0.18 micrometer-range. It is stated that aerosols detected on March 19 tend to have fractal dimensions close to 1, while the histograms for aerosols detected on March 15 show a more even distribution of fractal dimensions. I believe this trend is certainly apparent in the first two histograms. However, in the third, and especially in the fourth, this is not that clear. In the period from 21:00 to 24:00 the aerosol fractal dimensions seem to be as evenly distributed for March 19 as they are for March 15. (5) On section 3.4, page 11, line 16, it is mentioned that Cl and Cu were among the chemical elements detected on the samples analyzed by EDS. However, the concentration of those elements was not reported on Table 4. It should be corrected. (6) On page 12, line 8, it is stated that the particles in the 1.8-micrometer range have low oxygen percentage. However, it is not clear (and not stated) in what sense these percentages are low. For example, from the data given in Table 4, for both days considered, the oxygen percentage is larger for particles with sizes around 1.8 micrometers than for particles with sizes around 0.18 micrometers. (7) In the conclusions (page 13, lines 12-14) previous studies in Mexico City are mentioned without including any references. They should be included.

Technical Corrections. (1) The word “noon” used all along the paper produce confusion since it usually means 12:00, while it is 11:00 what the authors mean by it. They should say instead “near noon” or even better they should say explicitly “11:00”. (2) In the abstract (page 2, line 5) they say that “the presence of higher number of compact particles can be attributed to aerosol aging and secondary aerosol formation”. While this is plausible it is not conclusively proven in the paper. Therefore the word ‘can’ should be replaced by the word ‘may’. (3) On page 4, line 10, the phrase where the particle sizes are mentioned should be properly re-written, since they seem to be talking about exact values for the diameters, when they really mean two different (finite) ranges of size particles. (4) On page 4, line 20, the year when the measurements were carried out (that is, 2006) should be mentioned. (5) On page 5, line 11, it should be mentioned what the acronym MM5 stands for. (6) On page 8, lines 7-8, for the sake of clarity, the two hours

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when the SSA has the minimum values should probably be mentioned too. (7) The phrase which starts on page 8, line 23, and finishes on page 9, line 2, is confusing. It should be re-written for the sake of clarity. (8) On page 10, line 17, the word “that” after “except” should not be there. (9) On page 10, line 21, where it says “dimensions bins” it should say “dimension bins”. (10) Page 11, lines 1-3: the English writing should be improved. For example, “maybe they are composed” may be replaced by “they may have been composed”. (11) Lines 4-6 on page 11 are badly written. Additionally the authors should be specific about what kind of meteorological conditions they are talking about. (12) On page 11, line 16, the authors should be consistent with the notation and replace the word “Calcium” by the chemical symbol Ca. (13) The phrase in parenthesis on page 11, line 19, is badly written. Instead of simply “i.e. Figure 13” it should say something such as “such as those from Figure 13”. (14) On page 11, line 22, “Last two elements” should be replaced by “The last two elements”.

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