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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evolution of multispectral aerosol optical properties in a biogenically-influenced urban environment during the CARES campaign" *by* M. Gyawali et al.

Anonymous Referee #1

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I started reading this paper with great interest and expectation. Unfortunately, this turned out to be a summary of results from the CARES campaign and with no particular highlight. The paper goes through measurements made with the PASS and a nephelometers in great detail and draws on other data sets collected during the experiment to support some of the analysis. There is no 'conclusion' as such and it is more appropriate to call this a summary of the data. The primary result, that the Angstrom exponent changed from 1.6 to 1.8 from an upstream site to a downstream site, separated by a distance of 40 km, as an indication of BrC in the air mass seems a little suspect. There is no discussion on the uncertainty in PASS measurements and given a range of approximately 20% uncertainty in other similar instruments, this difference

of ∼10% seems fairly unremarkable and within the uncertainty range of the instrument. The primary problem may be that the data set is from a very clean environment and nothing much has happened during the study. The BC measurements are listed at about 0.06 ug/m3 to 0.16 ug/me on average. This is a fairly small signal and other numbers such as absorption are factors of 10 to 50 smaller than at moderately polluted sites. This introduces a large Signal/Noise problem in evaluating the results presented here and extracting any major conclusions. I appreciate all the work put into explaining the correlation between the wind directions and measurements and the possibility of mixing with biogenic emissions and anthropogenic emissions creating larger particles to explain some of the results. Much of these results are similar to what was seen before and probably less obvious in this data set. My primary issue is that there is no payback after spending several hours reading through this paper and the conclusions reads more like a summary than a conclusion. I am not entirely sure as to the purpose of Mie calculations. The refractive index is unconstrained (reasonable value used), the size ranges are prescribed and shape is assumed. Essentially there is a single constraint on what is a probably three parameter model and the results are in reasonable agreement with measurement are reasonable given the constraints imposed on the model. I am guessing, we have to conclude from the calculation that the shapes are closer to spherical.

Some specific comments:

The use of AEA (angstrom exponent of absorption) is confusing. The general use in literature is AAE and may be helpful to stick with that. This field is already pretty confusing.

Why not use the same wavelength pairs for making the AEA calculations? The AEA does seem to depend on the choice of wavelength pair as noted by Russel et al., 2010 and others.

A value of 1.8 for AEA seems much closer to dust type aerosols than BrC (Bergstorm

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et al., 2007). I guess this being a point measurement as opposed to column values in Bergstorm makes a difference?

Line 74; line 82; line 84: The use of cooling the climate and warming the climate is probably not common. Climate change or global warming or cooling may be more appropriate.

Line 88: have identified OA as a major absorber - This is a big claim. I would modified it to say something like 'a small fraction of OA was shown to absorb'

Line 188/189: Why use different wavelength pairs for calculating AEA at T1 and T0?

Line 317-319: I can't follow the logic here - why can't fresh or local emissions account for this change and why is a transport and particle size increase needed to explain this observation?

410: The AEA variation from 1.3 to 2.3:the higher values seem more like dust, have there been any measurements of dust aerosols during this time ?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 7113, 2013.