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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Relating hygroscopicity and composition of organic aerosol particulate matter" *by* J. Duplissy et al.

Anonymous Referee #2

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The authors define correlations between HTDMA and AMS data. SOA hygroscopicity strongly correlates with the relative abundance of the ion signal m/z 44. The analysis is applied to ambient measurements at Jungfraujoch and Mexico City and similar results are found. An empirical correlation between, the hygroscopicity parameter, Korg and f44 is given. The work provides an approximation that could be introduced as a simplification in the parametrization of hygroscopic OA in atmospheric models. The subject matter is relevant and of interest to the larger scientific community. The provided measurements and correlations will add to the existing body of work on atmospheric aerosol and their subsequent influence on particle hygroscopicity. The document is easy to read and the following concerns will clarify points in the paper.

CONCERNS:

The reviewer cautions that the application of the correlation (as published) is very narrow. The authors restrict their data set such that epsilon_org > 80% for non-hygroscopic org and >25% for hygroscopic organic (P19319). As presented, the work appears applicable to a global data set on organic aerosol, when in fact it is not. The authors even suggest a multiple linear regression of fx for a more accurate correlation. This should be emphasized in the abstract.

Why is the chamber RH set to 50%? What is the relevance of this value? Will the effect of humidity change hygroscopicity values for the SOA produced?

P19314. L17. How do you know the organic precursor was not completely reacted?

P19314. L24. "tetramethylethylene... reacts with ozone and produces OH in high yields" Were OH concentrations measured? In addition, "HONO was continuously replenished to keep a semi-constant OH source." How was this verified? Or was there excess HONO in the system?

P19318. L9. How do you know that "the aerosol was mostly neutralized with ammonium"? It is not clear to the reader.

P19318. L24. How do you know that the aerosol in Mexico was an external mixture? Is there any other evidence for this (besides GF measurement)? Why do the authors present GF data at 0.95% RH?

P19322 L 28. Define acronym BC.

Figure 3. why do data points scatter as the experimental time increases? Does the greater variation in chemical composition correspond to a greater variation in GF? And Kappa? Please discuss.

P19313 L13. Replace "and complemented" with "and are complemented"

P19320. L19. Text reads "all smog chamber data" but figure 5 says "all photooxidation experiments". Which one is true? How will experiments 7 and 8 (ozonolysis) modify

the figure and argument?

P19321. L4. How does f43 have “a strong correlation with GF”? f43 > 15% of what? R is at most 0.9 for a-pinene but in Figure 5, f43 is not shown. Also please define strong correlation for the reader. Is this what is meant by significance? What is this statistical significance parameter? It is not defined. How many standard deviations from the distribution are assumed? Is it 3sigma, 4 sigma, etc?

Fig 4. Which a-pinene experiment is presented? Is it a photo oxidation or ozonoloysis? Is there a difference in correlations for the different systems?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 19309, 2010.