

Interactive comment on “Quantifying aerosol size distributions and their temporal variability in the Southern Great Plains, USA” by Peter J. Marinescu et al.

Anonymous Referee #3

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In their manuscript, the authors present an analysis of 5 years of data with quality-controlled data that is carefully analysed using power spectral analysis. The main finding is that for the smallest particles, there is a diurnal cycle during the whole year and not only during springtime. Also, a 12-hour cycle is found. The paper is for a large part a description of the methods of achieving the analysis, and in this it is interesting and well-written. The conclusions are somewhat light and mostly agreeing with previous results, but the finding of the continuous cycle in the smallest particles, as well as the interesting application of the statistical methodology make this paper a good addition to the literature. Overall the paper is well written and I recommend that the article is published in ACP.

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I had a few minor comments that could be addressed before publication, which I have listed below.

* I am not sure whether replacing the season names with MAM, JJA etc. increases clarity. At least for me, it caused more confusion than just using the season names with a definition.

* page 4, line 25: “. . . concentrations around 3 μm was a data artifact.” Do the authors have an explanation for the cause of the artefact? Is this related to the factors given at page 5, line 3 (“ It is important to note. . .”)?

* Figure 4 and corresponding text: did I understand correctly that a bolded box means that the 5-95% range is significantly different than in the ALL case? how is this determined? Not being a statistician, I do not fully understand how this is determined, and maybe an explanation could be useful for many readers too.

* Figures 6, 8 and 10: the local time could be indicated as well as the UTC time. Alternatively, the solar noon and midnight could be shown in the plot.

* page 11, line 13: “The similarities between the timing of the peak concentrations of the 12-hour cycles for NT and N7-30nm further demonstrate the regulating relationship that N7-30nm has on NT .” - What is meant with regulating relationship? The smaller particle range seems to be dominating the size distribution, and therefore the total number follows the N7-30nm, but I don't consider this as regulating. This could maybe be clarified.

* Page 13, line 16: “Because size-resolved measurements for a longer time period were unavailable, cycles in aerosol number concentrations for periods of days to weeks were tested only for NT” I did not fully understand, I thought that the whole dataset was a size-resolved dataset?

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