

## ***Interactive comment on “Seasonal variations in aerosol optical properties over China” by Y. Wang et al.***

### **Anonymous Referee #3**

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1 The paper provides results on the seasonal dependence of the AOD and the Angstrom coefficient ( $\text{\AA}$ ) retrieved by CIMEL sun-photometer measurements over 19 Chinese sites. Results on the correlation of AOD and  $\text{\AA}$  values with ground measurements of the relative humidity (RH), temperature (T), and wind speed, respectively are also provided by means of scatter plots, which are used to infer aerosol properties of different sites. It is worth noting that AOD and  $\text{\AA}$  values are columnar averaged aerosol properties, which are retrieved from measurements performed during the sunny hours of the day. Conversely, RH, T, and wind speed are retrieved from ground measurements. In addition, 24-hour averaged RH and T values, respectively are correlated to AOD and  $\text{\AA}$  values, while the highest wind-speed recorded during a given hour of measurement is used to infer wind speed effects. The authors should explain in the text why

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parameters averaged over different time intervals are correlated in scatter plots. Why authors have not used wind speed, T and RH values retrieved from measurements collocated in time with sun photometer measurements? Can the authors provide at least some examples of correlation studies based on measurements collocated in time? The sunny-hour values of T and RH can be quite different than corresponding night-time values and the differences are quite dependent on seasons and the site geographical location. Have authors investigated these effects on correlation analyses? I believe that the correlation of RH and T ground measurements with columnar averaged AOD and  $\text{\AA}$  values is also quite affected by the daily evolution of the planetary layer height (PBL), which, in turn, is quite dependent on the geographical site location: 19 sites that are thousand of km away one from the other have been analyzed in this study. Have authors investigated the PBL height effects on the tested correlations? I also wish to mention that sometimes it is rather difficult to infer from the scatter plots of Figs. 2-7 author comments and conclusions. Therefore, I suggest to replace the scatter plots of Figs.2-7 with plots showing mean values of  $\text{\AA}$  (or of AOD) +/- 1 standard deviation versus RH, T, and AOD bin intervals. The statistical significance of changes should also be calculated. Some comments on the contribution of local and/or long-range transported air masses are provided in the text by the authors to support their analysis on the dependence of aerosol properties on site location. I suggest the authors to make use of analytical backward trajectories to better support their comments and convince the reader. Analytical backward trajectories of air masses represent a commonly used tool to provide information about the origin of the aerosols observed at a particular location and the dynamical patterns governing this transport of air masses (e. g. Kazadzis et al., ACP, 2007). In conclusion, I believe that the paper needs significant revisions before publication and I would like to see the revised version of the paper.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8431, 2008.

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