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Atmospheric Chemistry and Physics Discussions

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

Y. Wang et al.

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Because the last response was not showed at the Interactive Discussion, we supplement the response at the area. The paper shows the seasonal variations in aerosol optical properties over China by the network. We think the result of paper is very significant and originated. We wish continue to discuss the points with the referees. It is sorry the revised figures can not be showed at the area. ————————————————————-

Reviewer comments: Editor Decision: 4: Consider again after major revisions (further review by editor and referees)

Dear Jinyuan Xin, Below is the review of one of the reviewers regarding the revised version. As you can see there are still some obscure points and there is a clear need for clarifications. Thanks for addressing them in a carefully revised version. All the

best Nikos ——————————————————————— Response: Dear editor and referees, We are very pleased to eliminate the doubt of the data representative in the last revised version. We inevitably did not think some of the details, or we thought that they did not involve the subject of the article. At present, the data is shared and applied widely. We welcome that more colleagues can interest and expand its research value. We are glad to continue to exchange views with each other.

Comment： The authors have provided new data sets in the revised paper, as it can easily seen by comparing the scatterplots of the angstrom exponents versus the AOD of the revised paper with the previous ones. Indeed, it appears that the number of data points referring to Vmax$<$0.5 m/s is significantly larger than before. While, the number of data points referring to Vmax$>$10 m/s is significantly smaller than before. However, filled symbols hide other symbols and it is rather difficult to proper observe the behavior of data points referring to different clusters.

Response: The change of the number of different-cluster data is right. Because the range of the data is changed from one day to several hours (the real time: 10AM-2PM), the large value of meteorological parameter inevitably decreased and the small value certainly increased. You can see the different clusters’ behavior in the following figures (below figure 1 to 6). But we think the integrated graphics are more suitable for publication, at least they have not been fully covered by each other, and be able to be distinguished. In addition, the large clusters’ behavior is mainly concerned in these scatterplots.

Comment： —- This represents one of the main troubles of all scatter plots provided by the authors as I will outline below.

To this end, it is worth noting that authors do not provide indications on the total number of data of a particular cluster. This information would be rather important when results on the behavior of different clusters of a data set are provided. Is the number of data points of a given cluster statistically meaningful?

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Response: We do not deny that the number of data points is statistically meaningful. We add the number of data points in the scatterplots AOD&α (see below figures and in this revised version). However, the given clusters are not mandatory and quantitative. We think the large or small clusters can qualitatively represent the proprieties of certain aerosol types under certain given conditions.

Comment： Authors have also added in most of the scatterplots mean-value-plots (green filled box). I believe that they get mean values by averaging all data points, and as a consequence these last plots provide information on the behavior of all data set. However, it appears to me that authors do not discuss in the paper the mean-value-plots. May be, they believe that are not of interest! I believe that mean-value-plots (green filled box) could be useful to highlight the differences with the behavior of different clusters of a data set.

Response: Adding the mean-value-plots is the most valuable suggestion. The mean-value-plots are very interest and clear to hold out the point of view in the paper. They are also useful to highlight the differences with the behavior of different clusters. In this revised version, we have appropriately increased discussion about the mean, such as figure 2, 3, 4, 5. If the reviewers have better view, we ask you directly narrate the opinion to help improve the quality of the paper.

Comment： In particular, referring to Fig. 2 authors say (page 5, line 1): “The scatterplot of AOD as function of RH illustrates that continental aerosols (0.5<<1.5) are hygroscopic in nature and that small smoke aerosols (>1.5) and large dust aerosols (<0.5) are insoluble.”

I believe that a glance to the AOD versus RH scatterplot of Fig.2 can only allow inferring that mean AOD values are not dependent on RH, hence most of the aerosol load is made of insoluble particles. It believe that it is not quite evident from that scatterplot that “continental aerosols (0.5<<1.5) are hygroscopic in nature and

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that small smoke aerosols (>1.5) and large dust aerosols (<0.5) are insoluble.” May be, mean-value-plots referring to different clusters would have be rather useful to the reader to see that aerosol of different clusters are characterized by a different dependence on RH. Frequency distribution plots could also allow highlighting the different behavior versus RH of particles with <0.5, >1.5, and 0.5<<1.5.

Response: Through the cluster (<0.5) can not infer that large dust aerosols are insoluble because of a few data points, the cluster (>1.5) shows that AOD are completely not dependent on RH. The behavior of the cluster (0.5<<1.5) is different from the other clusters (see below figure 1), which AOD increases as the RH rise. This difference and large AOD in the cluster, we can deduce that the continental aerosols are hygroscopic. The sentence is changed to: “The scatterplot of AOD as function of RH shows that AOD are completely not dependent on RH when >1.5. The behavior of the cluster (0.5<<1.5) which AOD increases as the RH rise is different from the other clusters, which illustrates that continental aerosols (0.5<<1.5) are hygroscopic in nature and that small smoke aerosols (>1.5) are water-insoluble.” I do not know whether the statement is appropriate.

Comment： Again referring to Fig 3, authors say (page 5): ..” The scatterplot of ?as a function of AOD shows that when Vmax>10 m/s, aerosol particles are generally bigger than when Vmax<10 m/s, which implies that powerful winds below local large dust particles into the atmosphere during the springtime in northern China (Xia et al., 2004).”

This last sentence is certainly true, but I do not believe that it can be inferred from the scatterplot of ?as a function of AOD: most of the data points (crosses and open circles) are covered by filled triangles!

Response: By and large, the cross- and circle- points move downward with the

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wind speed increasing (see below figure 2, the different clusters figure). The cross-points (Vmax>10 m/s) is almost below  (～1.2), which the mean  is 0.26ś0.33. The mean  is 0.90ś0.48 when Vmax<5 m/s, while the mean  is 0.62ś0.43 when 5m/s <Vmax<10 m/s. The sentence is changed to: “The mean  is 0.90ś0.48, 0.62ś0.43 and 0.26ś0.33 when Vmax<5 m/s, 5 m/s<Vmax<10 m/s and Vmax>10 m/s, respectively. The scatter-plot of  as a function of AOD shows that large aerosol particles increase with the wind speed increasing, which implies that powerful winds below local large dust particles into the atmosphere during the springtime in northern China (Xia et al., 2004).”

Comment： Again few lines below authors say:

“The scatterplot of  as a function of T shows that  increases as T decreases when AOD<0.5, which indicates the background presence of smoke aerosols in autumn and winter due to biomass burning by the local farmers (Cao et al., 2005). “

I believe that the scatterplot of  as a function of T shows that  increases as T decreases even for AOD>0.5.

Comments similar to above reported ones should also be applied when authors discuss Figs. 4-7. However, I believe that it is not necessary to go on with the list.

Response: Some scatterplots show that  increases as T decreases especially at north China, which is correspond to the significant seasonal variation of the aerosol.  increases as T decreases even for AOD>0.5, I do not think, which is undesirable. After all, the phenomenon is more obvious when AOD<0.5 than AOD>0.5, below the figures of the different clusters, which markedly indicates the increase of smoke aerosols due to biomass burning.

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

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