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Discussions

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Interactive comment on "Chemical characteristics of PM$_{2.5}$: Impact of biomass burning at an agricultural site of the North China Plain during a season of transition" *by* Linlin Liang et al.

Anonymous Referee #1

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General Comments: The study of Liang et al. aimed to gain insights about the abundance of biomass burning smoke during the autumn-winter transition season, and explore the impact of biomass burning activities on the chemical properties of ambient aerosols. The data analysis was relatively straightforward, however, there were some issues with interpretation, especially there were some places with subjective interpretations. Although chemical characteristics of PM2.5 composition in minor, intensive and major biomass burning periods were presented in this study, contributions by biomass burning to PM2.5 or carbonaceous components was not quantified. There is nothing that is particularly novel in the study compared to previous work, and the environmental significance of the findings is not clear. The manuscript cannot be accepted for

publication in its current form.

Although the manuscript is not difficult to read, there are numerous grammar and language issues, which need to be addressed and improved. Several examples are listed below, Line 19: It's better to say "The measured daily average concentrations of LG, MN and K+ during this study period were 0.79±0.75 μg/m3, 0.03±0.03 μg/m3 and 1.52±0.62 μg/m3, respectively"

Line 53: "abundant" can be replaced by "extensive"

Line 84-85: "The study results demonstrate" is better to be revised to, for example, "The results of this study demonstrate", or "The results presented in this study demonstrate"

Line 133: "All measurement data quality was controlled according to standards….."

Line 137: "on" should be replaced by "at"

Line 197: repeated word "average" in "daily average wind speed averaged at…." … . . .

Other comments:

Line30-32: Why the finding that K+ did not increased as much as LG during extensive BB episodes indicated there were other sources of K+ in the study region?

Lin 84: "GC" should be defined here.

Line 103: Why quartz filters were prebaked in such a high temperature (850âĎČ)? This is different from the temperature widely used in other studies.

Lin 128: it should be "0.82 μg C/cm2"

Line 163: In this study, concentrations of EC were higher than SO42 , NO3- and NH4+, accounting for 13-17% of the PM2.5 mass. This is different from previous studies. Could the authors please explain why there were such high EC concentrations?

Line 170-181: There might be other reasons for the different distributions of secondary inorganic ions in different studies. For example, the major sources might be variable

with seasons and sites. Line 188-192: What about the variations of levoglucosan/OC ratio?

Line 216-220: The authors seemed to attribute the more significant differences of carbonaceous components during the nighttime vs. daytime compared to secondary inorganic ions to PBL. I can't agree. Please explain/clarify how PBL cause different accumulations or influences on carbonaceous components and secondary inorganic ions.

Line 220-223: I don't agree with the authors that there are no significant differences in chemical reactions of carbonaceous components and anhydrosugars during daytime and nighttime. For example, OC include primary and secondary organics, not only the sources but also the formation mechanisms or chemical reactions could be diffident during daytime and nighttime. Besides, levoglucosan in the atmosphere is also not stable and could undergo atmospheric chemical degradations according to previous studies.

Line 226-231: How about the difference in secondary transformations of secondary inorganic ions during the daytime and nighttime?

Line 277-279: What did the authors mean "the relationships between LG and OC, EC during daytime and nighttime were both better than those with SNA"?

Line 268-269: Are there any evidences for "frequent heating activities in form of straw burning"?

Line 287: "in the range of 1.38 to 1.82" seems only for SO2 but not for other SNA precursors.

Line 288-290: It's difficult to see the positive and negative relationships between gas precursors and PBL. Maybe better to change to scatter plots.

Line 291: If so, how to explain the lower CO concentrations in period âĚą compared to period âĚć?

Line 305-308: Seen from Fig. 4 and Fig. 5, there were also a large number of fire spots in the northwest. But why the authors stated that the air masses were "with rare biomass burning activities"?

Fig. 6: The authors presented LG together with OM. Do you mean LG is not belonging to OM?

Line 312-313: Similar to comments on Line 163, please explain why EC accounted for such a large fraction of PM2.5 mass, and stable in all days.

Line 354-359: Please revise "a time of strong process decrease in temperature". And maybe it's better to look into the reason why temperature dropped so quickly and significantly, and plot time series of temperature during these days. Besides, please add the sampling time for daytime and nighttime samples.

Line 359-361: I agree there are other sources for K+. But I'm wondering if there were fireworks and fertilizers during the study period.

Line 361-363: Since K+ is widely used as a tracer for biomass burning. It's better to illustrate from the emission characteristics of K+ and levoglucosan from biomass burning, and influences of combustion conditions (flaming and smoldering) and fuel types.

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2020-19/acp-2020-19-RC1-supplement.pdf