Interactive comment on "Aerosol composition and sources during the Chinese Spring Festival: fireworks, secondary aerosol, and holiday effects" by Q. Jiang et al.

Thanks for author's responses. I am glad to see that this paper is indeed significantly revised especially on the uncertainties of quantification of potassium and the English grammars. After reading the responses and the whole revised paper, I think some questions still need to be addressed more carefully. I will recommend this paper to be published in ACP only after those issues below being addressed.

1) It is good that the readers can know some details about the PMF factor determination in this paper. However, I am still not totally convinced about the HOA and CCOA recognition.

   HOA spectrum in this study shows clear PAHs contributions, which peak around m/z 77, 91, 105, 115 (Fig S6). The PAHs are usually more abundant in the coal combustion OA (Zhang et al., 2008). The authors argued that "Wang et al. (2013) showed a large decrease of these several *m/z*'s when the coal was burned with a high oxygen to coal ratio." However, the f44 (=*m*44/OA) in coal combustion OA spectrum of this paper is around 0.05, indicating this CCOA is a very fresh primary OA factor.
   The author said "Note that CCOA showed a small peak at ~8:00 pm which agrees well with that of chloride. This also supports the indentified CCOA factor." It is questionable that if the similar small peaks at 8:00 pm in the diurnal variation of CCOA and chloride are caused by the enhanced concentrations of both species in firework period during Lantern Festival. Diurnal variations excluding three FW periods should be examined. And also it seems that the time series of CCOA and HOA are very similar.

   If the PMF solution presented in this paper now is the best one that the authors can get, it is fine. However, please consider to address the questions above and avoid confusing.

2) "The authors said the contributions estimated in this work would represent the upper limits of firework."
   The authors regard regional transport during firework periods is one of the reasons that leads to an upper limit estimation of FW quantified. However, the authors do not know if the upwind airmass during FW are clearer than the background airmasses or not. Thus, it is unknown that the effect of regional transport is to dilute or concentrate the background aerosols during FW. If the authors argue that an increase trend of mass conc. of background aerosols in lunar Fifth Day that can prove a higher mass concentrations in upper airmasses (extra mass contributions to the background aerosols from regional transports). Whereas, the decrease trends of mass conc. of background aerosols in Lunar New Year and lantern Festival prove a dilution effect of upwind airmasses played. Then the authors cannot tell the effect of regional transport to the absolute mass concentrations of aerosol in FW is an upper limit or lower limit (dilution).
   About the mass fraction of FW aerosols to total aerosols: if the authors assumed the variations of aerosol concentrations because of regional transport in background air and FW emissions are linear proportional, then regional transport will not change the fractions of FW aerosols to total aerosols (Background+FW).

   In summary, the conclusion that the authors said in line 297 ("Considering above, the contributions estimated in this work would represent the upper limits of FW.") is invalid and vague. The regional transport is not a reason that makes the estimation of FW contribution an

upper limit, or it depends on the upwind airmasses. The role of regional transport contribution to the absolute mass conc. and fraction of FW aerosol to the total OA in different FW periods should be fully considered.

3) Line 319: "Therefore, our results might suggest that a large fraction of aerosol particles from the burning of fireworks was emitted in the size range of 1 – 2.5 μm." Have the authors considered coagulations and VOCs condensation on the aerosol phase during FW period?
4) Line 390 in revised paper: "contribution of POA increased as a function of organic loadings which varied from~35% to 63% when organics was above 80 μg m^{-3} (Fig. 7c)." The Fig. 7c only show data below 60 μg m^{-3}. No data above 80 μg m^{-3} are shown.
5) One suggestion about holiday periods vs non-holiday periods in Fig.9. Have the authors calculated if the O_3 increase in the holiday periods can be fully explained by NO_2 deduction. If not, then the extra O_3 enhancement in the holiday period may indicate the reduction of VOCs from anthropogenic sources in holiday periods as well.

References:

Zhang, Y. X., Schauer, J. J., Zhang, Y. H., Zeng, L. M., Wei, Y. J., Liu, Y., and Shao, M.: Characteristics of particulate carbon emissions from real-world Chinese coal combustion, Environ Sci Technol, 42, 5068-5073, Doi 10.1021/Es7022576, 2008.