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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Estimation of direct and indirect impacts of fireworks on the physicochemical characteristics of atmospheric fine and coarse particles" *by* Y.-Z. Tian et al.

Anonymous Referee #2

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A field campaign was conducted before, during and after the Chinese New Year so as to estimate the influence of firework display on ambient air quality. PM10, PM2.5 and chemical compositions were analyzed. Source apportionment models inclduing PMF, PA and CMB models were used to address the contribution of firework display on ambient PM mass concentration. The study developed an interesting and also very useful approach to identify the direct and indirect impacts of firework display on air quality. The future application of the developed model could be expected, and the extracted firework profile is also valuable and expected to be used in other studies. Acceptance of the manuscript, after some revisions listed below, is recommended.

11076, line 8, what did "them" stand for? To be specific.

11076, line 16, the mass percents here are arithmetic means or else, and what were the ranges? The sum of resuspended dust, biomass burning and direct-fireworks was >100% for PM2.5. This could be related to the model bias and uncertainties. Thus, the uncertainties in model development and extracted results should be analzyed and added into the present discussion.

11077, line 12, a ref is needed.

11079, line 9, "size-resolved PM" here means "PM10 and PM2.5" or else? Please clarify.

11084, lines 6-10, more detailed analysis on the PM2.5/PM10 fraction is required. Did the ratio differ between the light- and heavy-firework period, and did it vary significant during the high PM level episode.

11084, lines 17, also a deeper discussion on the OC EC concentrations and OC/EC ratio may be helpful to look into the difference between the light- and heavy-firework periods.

11084, in section 3.1, it is suggested to compare the levels of PM and its chemical compositions during the firework display period (light-, and heavy-firework periods in the present study) to those in other periods, if the authors had some previous studies in the non-firework period.

11087, line 20, what are the concentration of nss-SO4 during the two periods? and is the difference statistcially insignificant?

11089, line 35, delete "o" after "to"

11091, line 14-15, was the firework profile adopted from the cited referece comparable to that you extracted from the aforementioned PMF and PA?

11091, section 3.3.3 In the CMB analysis, the total firewok profiles from PA were used

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to investigate the direct and indirect impacts. Did any effort to use the extracted profiles from PMF analysis, although the results from PMF and PA generated comparable profiles, but in fact not the exactly same? And, is there any difference between that based on PA and that based on PMF?

11092, line 13, it stated that K Mg and Cr could be good tracers of firework, but on line 17, the profile of firework was reported with higher abundance of K Al Si Ca and OC. Two concerns arosen here, the first one is it is approciate to use K+ as a tracer for firework since it is widely accepted to be the tracer for the biofuel (crop straw and firewood) burning. A tracer must be unique for a specific source. The second concern is about Mg and Cr, if the level of them is very low (not high abundant species in firework profile), the use of them to distinguish firework and non-firework display periods might result in large uncertainty, Why Mg exhibit higher concentrations, but the major species did not have a higher level?

Fig 1. in addition to the mass concentration, it is more informative to compare the normalized composition profiles between the light- and heavy-fireword periods (maybe a new figure added in SI), so as to clearly indicate the higher abundacne species from firework display.

Fig 3. and also section 3.3.3, are the data in Pie chart the individual percents estimated during the heavy firework period? Is there any estimation of individual contributions during the light-firework period? And, are there any differences in the individual contributions between the light- and heavy-firework display periods.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 11075, 2014.