Atmos. Chem. Phys. Discuss., 14, C9847–C9849, 2014
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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "The impacts of fireworks burning at Chinese Spring Festival on air quality and human health: insights of tracers, source evolution and aging processes" *by* S. Kong et al.

**Anonymous Referee #1**

Received and published: 7 December 2014

This manuscript addresses the chemistry of firework burning particles and its environmental impacts. Based on the chemical analysis of the PM2.5 sampled during the Spring Festival in Nanjing, the authors studied the mass contribution and the important tracers of fireworks burning particles. The impact on the atmospheric visibility for each important component and the aging processes of firework burning particles were also discussed. The chemical analysis of the composition and aging processes for firework burning particles in this work are systematic and comprehensive. Some of the highlights of this work (e.g. Ba and Sr as the tracers for firework burning, and the increasing contribution of (NH4)2SO4 to visibility degradation during the aging pro-

cesses) are very important for better understanding the properties of firework burning particles and of interest to the readers. This manuscript could be accepted by ACP before the following issues being addressed.

1. The authors include “human health” in the title. However, the health effect is only discussed in section 3.4.2 and only focusing on the heavy metals. The discussion is very brief compared with those about chemical components and visibility. My suggestion is that the authors either add more detailed discussion about the health effect or simply delete “human health” from the title.

2. The increasing contribution of (NH4)2SO4 to visibility degradation is one highlight of this paper, and it is mainly demonstrated by Figure 7(b), which shows the relative percentage contribution of each species. However, the fine particle concentration dramatically decreased during 3rd - 6th Feb because of the weather conditions change. Consequently, the bext of total fine particles including the (NH4)2SO4 part sharply decreased, as shown in Figure 7(a). In this case, is it more reasonable to compare the relative percentage contributions between the two periods instead of the absolute values?

3. The period between 31st Jan and 6th Feb was also selected to discuss the aging processes in this manuscript. The authors observed that SO42- needs 6 days (2 days more than the other main species) to reduce its concentration to the pre-SF level. However, I don’t think that it is a proper time interval to discuss the aging processes. The chemical composition of aerosols could be greatly changed along with the change of weather conditions.

4. According to Figure1, an iron smelt plant located to the east of the sampling site. I wonder what was the operation condition of this iron smelt plant during 3rd - 6th Feb with strong east wind. It seems that the plant must be shut down (which is unusual), since there was no source concentration from iron smelt during SF as shown in Figure 9. The iron smelt source concentration was nearly none for Pre-SF, SF and After-SF



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but is 7.2% for Whole period. The authors didn't give the exact dates for the Whole period. Does the Whole period equal "Pre-SF + SF + After-SF", or equal "Pre-SF + SF + After-SF + 7th-11th Feb (the weekdays not discussed in the manuscript)"?

5. In the manuscript, data from 7th to 11th Feb were not shown because they are weekdays with other main pollution sources than fireworks burning. Accordingly, the authors should show the 7th-11th break in Figures 2, 6, 7, 10 and 11. I strongly suggest that these data should be presented (at least in the supplementary material) and be compared with the Pre-SF and After-SF data.

6. A lot of abbreviations (maybe too many) were used throughout the manuscript. In equation (1) and (2) in section 2.4.3, what are the meanings for BD and PEF? I cannot find the annotation of these two abbreviations in either the manuscript or the Table A1.

7. The PM2.5 samples were collected for 24 hours in this work, but the starting point (12:00 am?) was not given in the paper. The detailed time scale for the 24-hours sampling should be given in the Methodology Section.

8. Some typos: Line 20 Page 28626, "holidy" should be "holiday". Line 9 Page 28611, Line 1 Page 28615, Line 1 Page 28624, Line 2 Page 28625, Line 18 Page 28626, Line 21-22 Page 28629 and Line 18-20 Page28630, "descreased" should be "decreased". Line 12 Page 28622, "transportation should be "transport".

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 28609, 2014.