

Interactive comment on “Impact of anthropogenic emission on air-quality over a megacity – revealed from an intensive atmospheric campaign during the Chinese Spring Festival” by K. Huang et al.

Anonymous Referee #2

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This study presents measurements of gaseous pollutants and aerosols made at a site in Shanghai during the Chinese Spring Festival in 2009. The authors focused on the change in pollution before, during, and after the week-long national holiday, when significant fluctuation in anthropogenic emissions was expected. It was suggested that the elevated pollution levels before and after the holiday was mainly due to the traffic flow out of and into Shanghai, respectively, while fireworks contributed to the pollution episode on the Chinese New Year's day. The authors also attempted to attribute aerosol light extinction to different species as well as the atmospheric moisture. It is a good idea to estimate the impact of anthropogenic emissions on air quality through such “virtual atmospheric experiments”, but there exist several major issues in both

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experimental method and data analysis in this study. It is this reviewer's opinion that the manuscript needs major revisions before meriting publication in ACP.

Major Comments:

1) Methodology

a. The authors provided little information about the site, only indicating that it was on the campus of a university. It appears that the site was in a fairly urban setting. Is it possible that the reduction in traffic emissions near the campus was greater than that in other parts of the city – since the university could be in winter or holiday break? If this is indeed the case, then the representativeness of this site for the study is questionable. In any case, information or estimate on the change in anthropogenic emissions in the study area would be useful for interpret the data.

b. Given the daytime peak in SO₂, it is likely that the measurements around noon could represent relatively more regional sources, instead of local emissions. The authors may want to also analyze these data to gain some insight into the regional sources.

c. How did the TEOM instrument perform under the quite humid conditions encountered during the study? Was the sample flow heated, and to what temperature?

d. Any measures to address the potential interference of NO_y species on NO₂ measurements?

e. Was the forward scattering accounted for in the aerosol scattering measurements?

f. It is highly likely that the aerosol absorption was overestimated by the Aethalometer, due to multiple scattering and also filter loading effect. Empirical correction method has been proposed in several previous studies (e.g., Arnott et al., 2005). A comparison between absorption and EC may also help.

g. There is no mentioning of the measurement method and location of visibility in the manuscript.

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2) Data analysis

While the authors stated that an objective of the study was to evaluate the impact of anthropogenic emissions on air quality in Shanghai (also reflected in the title of the manuscript), they have not separated the effects of meteorological conditions and change in emission sources. For example, the lower aerosol concentrations during the holiday may be related to the stronger precipitation. The higher concentrations of secondary species after the holiday may be due to extended period with high RH. Very stagnant conditions between Jan 26 and 27 may as well have contributed to the pollution episode.

The manuscript also lacks focus. For example, the part on the diurnal cycle is at best only very loosely related to other parts of the study. Readers can be easily distracted here.

PCA was used to determine the major sources of aerosols in Shanghai. The temporal change of these different derived sources or factors during the experiment can probably shed light on the change in anthropogenic emissions during the holiday. The same group of authors recently published a paper also on air quality in Shanghai. The authors may want to highlight in this paper the differences between the two studies, and what new conclusions can be drawn from this study.

Page 17162, Line 15-24: as already mentioned, the daytime peak in SO₂ was likely caused by boundary layer processes, not the change in utility generation.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 17151, 2012.