

***Interactive comment on* “Satellite Data Reveals a Common Combustion Emission Pathway for Major Cities in China” by Wenfu Tang et al.**

Anonymous Referee #1

Received and published: 24 January 2019

This paper reported the decadal changes in the efficiency and cleanness of bulk combustion over large cities in mainland China using satellite observations. The authors have done a lot of works, which are very impressive. It is very interesting to see the temporal variations of SO₂/NO₂ and CO/NO₂. The driving forces of the variations have not been well explained in the text, even though many details are provided. I recommend publishing the paper after reorganizing the parts about driving forces.

General comments:

1. The influence of inter-annual variations due to meteorology. The authors mentioned that analyzing molar ratios rather than absolute molar concentrations contributes to decrease the effects of meteorology. I'm wondering how it works to account for the temporal variation in lifetimes of air pollutants associated with meteorology.

2. The analysis focusing on the differences of SO₂/NO₂ between the US and China needs substantial improvements. The authors listed the possible reasons for the differences in Page 8. However, no quantitative analysis at urban scale has been performed. For instance, the shares of fuel usage and emissions contributions from different sources for typical cities are expected, which suggest the different emissions characteristic between the US and China. Additionally, the declining SO₂/NO_x is most likely caused by the de-SO₂ procedure in China (Li et al., 2018). The related discussion is missing. The recent reduction in NO_x emissions (van der A., et al, 2017; Liu et al., 2016) has not been discussed as well.

3. Too many very lengthy sentences. The authors preferred long sentences through the manuscript. However, those sentences are too long to understand sometimes. I would suggest the authors to go through the text and to simplify some sentences when necessary.

4. section 3.3. This section is trying to explain the driving forces of the trend. It contains many details and the readers may be easily lost. I would recommend the authors to summary the main findings and storyline somewhere in the beginning or at the end of the section, and to reorganize this section based on the summary.

Specific comments:

1. Page 1, line 14, the phrase of “mature satellite instruments sounds not fine. What is the definition of mature? Which instruments are not mature?”

2. Page 1, line 31. The English seems to be incorrect.

3. Page 6, line 8. “Here, we treat emissions of these species across the entire extent of the megacity as a point source” As far as my understanding, the authors discarded all the CO and SO₂ measurements where there are no NO_x measurements. Could you please clarify how do you set up the criteria and why does the criteria make the entire urban areas to a point source?

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4. Could you please give the definition of “Combustion Emission Pathway” somewhere?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1121>, 2018.

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