

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-192-RC2>, 2021
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Comment on acp-2021-192

Anonymous Referee #4

Referee comment on "Measurement Report: A Multi-Year Study on the Impacts of Chinese New Year Celebrations on Air Quality in Beijing, China" by Benjamin Foreback et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-192-RC2>, 2021

This manuscript presents a detailed analysis of air pollutant during the Chinese New Year (CNY) over multiple years in Beijing based on comprehensive datasets. The influence of CNY celebrations on local air quality is investigated. The measurements and data have been made carefully and then the interesting results are presented, especially its unique difference inside and outside the 5th Ring Road during CNY. However, it could be more thorough when interpreting some results. In addition, there are also some language issues and editing needs that have to be addressed. The authors need to make a careful revision on the discussions to improve the overall quality of the paper for publication in ACP. I would recommend the editor to reconsider the paper after a major revision by the authors.

Specific Comments:

- The introduction should include the new perspectives of your work. When cite the previous studies, it is best to expound what are the difference between your work and others, rather than just laying out the results of previous research.
- Line 83: The specific question you aim to answer: (ii) how are these changes connected with meteorological conditions, the current analysis is too brief, the authors may consider adding more materials to enrich the discussion, such as the weather process before and after CNY.

- Lines 334-346: Since Fireworks were formally prohibited within the 5th Ring Road of Beijing beginning in 2018, why the enhancement of PM₅ concentrations during CNY varied significantly from year to year. Please further elaborate to support your analysis. In addition, can the author give the differences of other pollutants which are link to fireworks emissions inside and outside the 5th Ring Road from 2013 to 2019?

- Line 133: The authors introduce the nano-SMPS and NAIS in Section 2.2, respectively. Maybe some discussions about the PSD of nucleation mode measured by the two instruments should be given.
- Line 232: The information of meteorological conditions should be more discussed and displayed in figures in section 3.2 so as to more fully explain that the influence of meteorological conditions is relatively small.
- Line 248: Both the 2018 and 2019 CNY are feedbacks after the implementation of the policy. Apart from the effect of fireworks celebration on the level of PM_{2.5}, other sources should also be discussed during the CNY period. During CNY in 2018, the enhancement in PM_{2.5} inside the 5th Ring is higher than the outside. Is this the influence from other sources?
- Line 320: A long term multi dataset was used to further demonstrate the effect of the policy in reducing PM_{2.5}. But there appear diversity differences between inside and outside 5th Ring from 2013 to 2016. And there is no obvious difference between outside and inside the 5th Ring during 2019 CNY as shown in Fig.8, with one exception.
- Line 341: In 2015 and the first part of 2016, the enhancement of PM_{2.5} between inside and outside the 5th ring is opposite when compared with most years. How does the author consider the differences in 2015 and 2016 in Figure 9?
- Line 390: The link of the dataset during the CNY in 2018 and 2019 should be given in the acknowledgements.

Minor Comments

- Some abbreviations are incorrect, e.g. Line 112: "PM2.5", "PM10", please check the whole text.

- Line 52: add the definition before "CNY", because this is the first time it appears in the

introduction.

- Section 2.2.1: The authors should give more detailed descriptions about the instruments.

- Line 165: should be "Kürten et al. (2012)".

- Line 176: should be "Song et al., 2017; Tao et al., 2016", please check the citation format throughout the paper.

- Some descriptions in this paper should be more quantitative, such as line 303: "there was a spike in pollution around midnight during the CNY".

- Lines: 306-308: The author attribute the pollution events following CNY to firework burning as well, please give more evidences.

- 7: The pollutant concentrations seem low in 2013 and 2014 compared to other years before prohibition on firework, do you attempt to figure out the reason?

- Section 3.5: You should compare your results with previous studies. It is best to add more references in these paragraphs.

