Atmospheric Chemistry and Physics Discussions

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Comment on acp-2021-192

Anonymous Referee #2

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-RC1, 2021

Thank you for the work you have done. It is indeed interesting to note the differences in the air quality after regulations on firework/firecracker are implemented, especially with the wide suite of instrumentation you have, including the historical data from the government. Some general questions, comments, and suggestions are offered below.

There is a need to indicate what is new about this study compared to other work on CNY in the area. Are there other references that can be cited regarding studies done in the area of China in general?

The objectives of the study can be further condensed and the focus of the study can be made clearer. The flow of the conclusions (which address the objectives) can also be improved with the more focused objectives.

The discussions can be further expounded. Some of the discussion flow can also be improved (i.e. the transition from paragraph to paragraph can be made smoother). The discussions also need to connect the spikes in the emissions measured to the known firework sources (chemicals) in Beijing so that it can connect to what is being measured. The link to the meteorology can also be further expounded. The discussion on the size distribution is interesting and can be enhanced. Is there something new that was observed? As for the trends, perhaps statistics can be put in (several instances of increases and decreases were mentioned with no quantification).

In the conclusions it is good to note the impacts of the CNY to air quality in terms of health standards, background air quality and other points of comparison that may be helpful to assess the impacts more objectively. Also how this study is new compared to other work can be discussed in the conclusions as well.

Details are listed below:

Line 26: What aspect of the celebrations? The fireworks and firecrackers? Or including traffic?

Line 27, 30, 78: "comprehensive analysis and detailed analysis" needs to be more specific (i.e. gases and particulates, elements, size-speciated?)

Line 28: The type of "data" should be noted (how many sites/locations etc…)

Line 30 and 63: …before CNY is vague, be more specific when this happened… also is this a total prohibition of the use of fireworks and firecrackers? It is not clear. What's the significance of the 5th ring road of Beijing?

Line 32: "significant peak… though not as strong" are not clear, can numbers be used?

Line 34: Is it possible to quantify this "decrease"?

Line 35-36: Can you note why SO2 and BC are the highest?

Line 40: Is this improvement just for the two years? It's not clear.

Line 66: Which "toxic pollutant" is being referred to?

Line 68, 105: Maybe consider including a table of the observations made by the different instruments, including parameter measured (size range if particles) and sampling period, time resolution, and location?

Line 129: Indicate the time resolution of the meteorological data and other subsequent data.

Line 134: The first sentence needs to be improved. The PSD is measured by the PSD?

Line 152: Define PSM

Line 159: NO3- should be NO_3^- (apply the proper subscripts and superscripts for chemical names) throughout the document… in other

Line 193: Where are these "previous studies" located? This information should actually be in the introduction. Is it possible to have a rough estimate of the increase during this time? This is to confirm the word "sharp" used to describe the increase.

Line 197: What does "significant" mean?

Line 198: Haze report, is there a reference for that?

Line 200: "There is also a noticeable spike in SO2 ," this can be quantified.

Line 204: What are typical background values?

Line 211: The discussion jumps, "however, a high NO2/NOx ratio." What did you observe of this ratio for your measurements?

Line 216: Should you indicate which are the primary pollutants?... sulfuric acid and ozone react to elevated concentrations of what?

Line 222,225: all the other pollutants: best to be clear which pollutants you are talking about.

Line 227: What is the link to the meteorology for your case, the past studies can be put in the introduction so you can focus on the results here.

Line 243: How low? Quantify?

Line 244: This sentence is confusing, can improve.

Line 259: Do you mean primary emissions are not observed in 2019, it's not clear in the sentence?

Line 269: The sentence is too long, can be broken down. The end of the sentence (for 48 hours before through 48 hours after the CNY) is not clear.

Line 272: Did you mean the filled in circles? Rather than the darker colors?

Line 275: What are these recent results?

Line 276-279: There notes on lower and higher, but it is not clear in comparison to what. The discussion can be improved with references, perhaps discussed in the introduction on what are typical sizes of the firework/firecracker emissions.

Line 291: Is this area the only area with prohibitions? How far away is the next area where there are no prohibitions?

Line 306: How is the haze apparent from the plot?