

Interactive comment on “Measurement report: Fireworks impacts on air quality in Metro Manila, Philippines during the 2019 New Year revelry” by Genevieve Rose Lorenzo et al.

Anonymous Referee #2

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Statement:

This article investigates firework pollution during the 2019 New Year celebrations in Manila, Philippines. It takes a comprehensive approach of investigating the emissions and aftermath of the fireworks from a number of angles, including atmospheric composition, meteorological conditions, transport, and growth/decay of particles. It also investigates changes to atmospheric properties as a result of New Year celebrations. There are several measurements taken during this observation period that are unique to this study.

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The authors provide an analysis of pollutants, including particulate matter, metals, and toxins. Further, the article includes particle mode analysis. Concentrations of many pollutants, metals and toxins increased dramatically during the celebrations. Some of these dispersed within a few minutes whereas others stayed longer. Some of the observed compounds decreased during the New Year, which is either attributed to interactions with firework emissions or is attributed to the decrease of normal-day human activity, such as traffic. The study also shows that the chemical behavior of the atmosphere, e.g. particle hygroscopicity, can be altered by firework emissions.

Some of the content, especially in the Results and Discussion section, is rather choppy and needs to be restructured. There are numerous comparisons with other cities without much context explained. Some of the content in the Results and Discussion should be moved to the Introduction or Methods sections, noted in the specific comments below.

The results and conclusions of the article include a blend of scientific and detailed technical observations. Consequently, this feels like it is somewhere in between *ACP* and *ACP Measurement Reports*. I would suggest revisions to either make the paper more scientific in nature to submit to *ACP*, or focus on the new and unique measurements and keep it in *ACP Measurement Reports*.

Should the authors decide to keep the article in *ACP Measurement Reports* with revisions, I would gladly re-review the article.

Major comments:

The article feels a bit choppy. It jumps from one subject or result to another without necessarily any coherent transition. A few examples are noted in “Specific comments” below. With some revisions to connect different points together, I think this article would flow much better.

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The abstract states, “there have not been any comprehensive physicochemical and optical measurements of fireworks and their associated impacts in a Southeast Asia megacity.” A similar statement is made in the Introduction. This statement seems a bit bold and also vague and contradictory to the fact that several other studies of firework celebrations in China and India are cited. Perhaps the authors don’t consider China and India to be Southeast Asia, but regardless, this statement needs to be more clear. For example, which measurements have never been done before, and which are new in this study and not in the other cited studies? Is this the first study of its kind in the Philippines?

There are many measurements and results here, and not all of them are linked or compared to each other. This contributes to the choppiness of the paper, and there could be more description of how the different observations and results relate to each other.

The conclusion mostly reiterates the results in bullet point form. This needs to be more concise, with only key findings pointed out. Then the conclusion needs to include more relevance to the aerosol measurement science and/or the greater scientific community and public.

This article was submitted to *ACP Measurement Reports*. In general, there is alignment with the aims of this journal in terms of measurements of various compounds in Manila, which is a new location for such study. This study also contributes new types of measurements. However, the questions in lines 149-155 are more broadly scientific in nature, and the results and conclusions package these results into a more scientific format, similar to other studies on the effects of firework pollution. At the same time, the scientific conclusions are minimal, and focus is very local and not focused on the bigger scientific aims of *ACP*. In its current form, the content and nature of this article feels somewhere in between *ACP* and *ACP Measurement Reports* and not focused on one or the other.

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From the website of *ACP Measurement Reports*:

Measurement reports present substantial new results from measurements of atmospheric properties and processes from field and laboratory experiments. Analysis of the measurements may include model results and conclusions of more limited scope than in research articles.

Although this study might be the first of its kind in the Philippines, the results are expected and not necessarily new with respect to the many existing publications related to air pollution from firework celebrations. The article needs more emphasis on the aspects of the study that can be considered as “substantial new results.”

Therefore, I would suggest the paper be revised as one of the following:

- Revise the overall nature of the paper to focus more on the scientific and societal contribution of the study, and then submit the paper to the main *ACP* journal. In particular, include more in-depth scientific answers to the scientific questions asked in lines 149-155. Additionally, scientific results could, for example, include: How do the results of this study help scientists, policymakers and the general public in not just the Philippines but around the world, and how can these results be used to improve air quality during the New Year in the future?
- Revise to focus more on the aerosol technology, specifically the measurements that are new and unique. There also needs to be more elaboration to how this contributes to the aerosol measurement community. With such revision, this would better align with the aims of *ACP Measurement Reports*.

As an example of what could be revised, the article throws in comparisons with various other cities around the world in with the results/discussion. This shows promise for good scientific content. In its current form, however, these comparisons cause the article to feel choppy. What is the relevance of these comparisons? What do these

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comparisons to other cities contribute to either aerosol technology and/or to the general scientific community and public? These comparisons could be elaborated and made more scientific.

One thing that really stood out to me is the toxins, especially lead. This brings to mind a hypothetical question: Could it be possible to use this study to make an argument to policymakers to forbid the use of these toxins or find alternatives to these toxins in fireworks? Although such recommendation might be outside the scope of this specific Measurement Report, elaboration on the seriousness of lead and other toxins in fireworks, which were clearly observed in Manila, could be emphasized more – this could make the paper into a stronger contribution to the scientific community and general public, and it could make the conclusions much stronger.

I would also suggest making a timeseries figure with these metals and toxins, not just a before/during/after figure.

Specific comments:

Title: The plural of “Fireworks” plus the second noun “impacts” is not correct English. It should say any of the following: “Firework impacts” or “Impacts of fireworks” or possessive “Fireworks’ impacts”.

Lines 54-59: Listing these specific numbers from cities around the world is not necessary, and giving these numbers does not add any significance to the article. The two sentences following this are sufficient for this paragraph.

Line 64: “India where” should be “India, and”

Lines 161-163: This sentence doesn’t make sense, and it is irrelevant to the article. This topic is not discussed anywhere in the article.

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Lines 207-214: The sentence beginning with “Although” through the sentence ending with “study” do not belong in this paragraph. This is introductory material, not methods.

Line 211: The sentence, “There was limited firework after midnight” needs to be more specific and clear – what does “limited” mean, and with respect to what, specifically?

Section 2.7 “Back Trajectories” should be moved to after section 2.2 “Meteorological Data” for better flow of related content and to be consistent with the order in which results are presented.

Line 293-295: This first sentence should be in the introduction or methods section, not results.

Lines 325-329: The last two sentences in this paragraph jump back to talking about fireworks in other countries, which was already stated in the introduction and are now redundant. These two sentences could be deleted. Alternatively, if the intention is to make a scientific comparison of Manila in 2019 to other cities, then this needs to be elaborated, and the comparison needs to be done in more scientific detail.

Lines 330-332: This first sentence was already stated in the methods sections and is redundant here.

Lines 353-358: Again, this is jumping back to methods. Only the last three sentences in this paragraph are the results.

Lines 364-367: These first two sentences are also describing methods of calculation as opposed to results.

Lines 393-394: Again, this jumps back-and-forth from showing results to comparing to another city. If this kind of comparison is desired, then another sentence or two describing the relevance and greater context of this should be added. This should be in a separate paragraph rather than squeezed in the middle of a paragraph reporting numerical results.

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Lines 404-405: This is another comparison to a different city that doesn't quite fit in between reporting numerical results from Manila.

Lines 429-433: Here is another comparison to a different location, this time Taiwan. Here, though, the relevance is better explained, and it flows better than these comparisons in other places in the manuscript, but then the following sentence beginning with "The lack of increased sea salt" jumps back to results/discussion in Manila. I would suggest the comparison to Taiwan be moved to a separate paragraph.

Lines 485-486: "Lead is highly toxic and thus regulated (Moreno et al., 2010) as its occurrence in fireworks is not ideal." – I would say it's more than just "not ideal;" it sounds like a serious health hazard to me.

Lines 570-573: This is again a place where the text jumps into comparisons with specific other cities. The relevance and context needs to be elaborated a bit more.

Figure 3: Why does this figure use UTC when the other figures use local time? Then there is unnecessary text in the middle of (a) stating that 16UTC is midnight local time. I would suggest using local time because the study is with respect to the New Year (centered around 00:00) and to be consistent with other figures.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2020-1028>, 2020.

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