

Interactive comment on “Superaggregates or instrument artifact?” by Ashley M. Pierce et al.

Ashley M. Pierce et al.

ash.pie4@gmail.com

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Anonymous Referee #2 Received and published: 29 December 2017 The paper reports a potential artifact during aerosol sampling due to aluminum tubing fretting. I think that making the community aware of this potential artifact is useful; however, I have some reservations regarding the title of the paper, the focus of the abstract/introduction, and the general organization. While the sentences are mostly clearly written, I found the paper confusing, I'll try to explain why next. As it is, I think, the paper (especially considering the current title) might be misinterpreted as if the superaggregates detected in past work, and discussed in the literature, have been erroneously identified as such, while they were just an artifact. In reality, the current paper and findings have little to say about soot superaggregates, in my opinion. The agglomerated particles presented here have, apparently at least, nothing to do with the soot superaggregates reported and discussed in the literature. These aggregates (e.g., from Figure 7) look

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very different (even just visually) from the soot aggregates reported in Chakrabarty et al., for example; these are composed of a mixture of elements, including an abundant amount of aluminum, while the soot superaggregates are mostly composed of carbon. The soot superaggregates morphology (including the nanostructure of their monomers) is clearly defined in literature, while in this paper there is no detailed morphological analysis to compare to. For example, there is no attempt to find the fractal dimension or the monomer size distribution, or their nanostructure. While I still think it is very valuable to make the community aware of the potential presence of these aggregates due to a possibly common sampling artifact, I think the link in the introduction, in the abstract and in the title to soot superaggregates is not clear at best, and deceiving at worst. In addition, while reading the paper for the first time (especially, because of the issues mentioned above), I was not really clear until the very end, where it was going to take me, and I think the main result should be highlighted much earlier on. So, while most of the method and analytical approach and description can be maintained almost as they are, my suggestion would be to:

Response: Thank you for your comments on the manuscript. The authors would have liked to perform morphological analysis had there been resources available for such analysis. As it is, the visual inspection and EDS reports, as referee 2 has mentioned, were more than sufficient to determine that the aggregated particles in this study are indeed different from superaggregates in previous studies. It was stated both in the abstract (“However, further analysis revealed that these particles were dissimilar to superaggregates observed in previous studies.”) and in the introduction (“The observation of aggregates that did not conform to the description of superaggregates from previous studies led us to wonder if the observed aggregates may in fact be an artifact of the instrument setup and not an ambient air phenomenon.”) that these aggregates did not conform to superaggregates previously observed and were likely an instrument artifact and not an ambient air phenomenon. The authors have shortened much of the discussion on superaggregates to reduce any confusion on the intent of the paper.

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1. Change the title and get away from the term superaggregate (these are just aggregates), and make it clear what the study is about: an artifact of particles aggregates containing aluminum.

Response: The title has been changed. Based on comments from referee 1, we have clarified that aggregates in this paper refer to large aggregated particles observed in this study while superaggregates refer to large aggregated particles observed in previous studies.

2. Refocus the introduction, onto the real findings of this study, and much less about the "link" (which in my opinion is non-existent) to soot superaggregates.

Response: Due to the finding of aggregates particles that resemble superaggregates, the authors think that it is important to point out caution when analyzing samples as possible "superaggregates". We have shortened much of the introduction related to superaggregates but feel some discussion is important.

3. Make the main findings clear early on in the paper; for example, the abstract does not even mention about the aluminum present in these aggregates and the possible tubing fretting corrosion origin, while I think that's the main interesting finding. Instead most of the abstract, since the beginning, focuses on soot superaggregatss, which again, in the end, have nothing to do with what sampled.

Response: Some discussion on superaggregates has been removed from the abstract and more focus on the differences has been added.

Some specific additional comments: - Line 12, page 6: Why "black"? This becomes clear later, but here is not clear.

Response: This has been changed to "Aggregates, black in color, . . .)

- Line 22-24, page 8: These correlations are discussed earlier on, the repetition here is a bit confusing, I would suggest consolidating all in the discussion.

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Response: The correlations are discussed in the results section in full. The correlations are mentioned again during the discussion to reduce the need to look back at the results when discussing what the correlations indicate. This has not been changed.

- Paragraph starting at line 30 of page 8: It is not very clear to me why hygroscopic growth is even considered or discussed here. I am not saying it should not be discussed, I am just suggesting it should be made clear why hygroscopic growth should result in aggregation? What is the hypothesis (e.g., a mechanism) behind a possible link between the hygroscopic growth and the presence/formation of these aggregates?

Response: A sentence has been added here to clarify this.

Line 34, page 9 and line 1 on page 10: SEM stays for scanning electron microscopy, I think; so, I believe you should not write "SEM... collected", you can't really collect SEM; maybe "SEM samples... collected" or "SEM images... collected", or something similar?

Response: This has been changed to SEM images.

To summarize, from the point of view of the main material presented here, I would say only minor revisions are needed (no need for new or different analysis or data, for example). I chose major revisions just to underline that a change in title, focus, and organization, would make the paper stronger, clearer and more appropriate.

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