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Title: Analysis of New Particle Formation (NPF) Events at Nearby Rural, Urban Background and Urban Roadside Sites

Author(s): Dimitrios Bousiotis et al.

MS Type: Research article

Iteration: Minor Revision

RESPONSE TO THE CO-EDITOR

Comments to the Author:

Dear authors,

Thanks for revising the manuscript.

The main concern of the referees is the large lowest detectable size of 16.6 nm of the SMPS system. The referees are right that it is difficult to assess the aerosol formation with the measurements starting with such a large size. As a result, you have modified the manuscript and softened some of the conclusions. I still recommend to add a note about the measurement size also to the abstract and the conclusions.

RESPONSE: A note has been added in both the Abstract (line 31) and Conclusions (line 549) about the size range of the available data.

I have few additional comments that require some work.

Line 51: Clarify what do you mean by urban pollution.

RESPONSE: A clarification has been added about sources of urban pollution at the end of the abstract (line 51 of tracked version).

Line 125: What do you mean that particle formation was found to take place on event and non-event days.

RESPONSE: A clarification has been added about particle formation taking place but not qualifying as NPF events due to either newly formed particles not surviving or lack of growth (line 126).

Line 183: Confidence level typically implies statistical methods. Please modify the sentence.

RESPONSE: Confidence level has been changed to level of certainty (line 187)

Line 188: how frequent were the bursts detected with the CPC?

RESPONSE: An estimation of the frequency of the bursts and an explanation has been added (line 193). This estimation is based on a quick review of the data. To provide a more precise answer the whole dataset would need to be analysed again.

Line 223: What would the result be, if you would follow the mode through the night? Was growth typically persistent through the night? Setting a deadline for the midnight is rather arbitrary.

RESPONSE: A justification has been added of the reason why the end of the day was chosen as the final point for the growth rate calculation (line 228).

Line 237: NSF was proposed by who? Please add a reference.

RESPONSE: Reference added (line 245).

Line 280: From where was ammonia data available from? Please add a short section on ancillary data to the methods section.

RESPONSE: The data source has been added (line 166).

Line 299: From where did you get the organic compounds? VOC data it seems, but this is not described. Please describe in the methods section.

RESPONSE: The data source and measurement method has been added (line 168).

Line 315: Cluster 3 and following discussion is difficult to follow, but it clear after reading the section 3.3. Please summarise the trajectory analysis results here or consider structural changes.

RESPONSE: The chapter with the back trajectory analysis for the NPF events at the background sites was moved after the general back trajectory analysis for all three sites. Text and figure numbering were updated to match the changes made.

Line 320: again organic carbon concentration. From where?

RESPONSE: The data source has been added (line 169). Also, the text has been updated to indicate that the organic carbon concentration refers to both sites (line 487).

Line 323: low growth rate and consequently low survivability

RESPONSE: The text has been updated to address the suggested correction (line 490).

Line 329: How did you determine particulate organic carbon concentration?

RESPONSE: A data source has been added (line 167).

line 341: With the instrument that detects > 16.6. nm size distribution, one cannot assess the initial states of newly formed particles.

RESPONSE: The text has been updated to address the correction. "Initial stages" was changed to "early stages" (line 347).

Line 358: Ethane, from where is the data from?

RESPONSE: A data source has been added (line 167).

Table 1: A fraction of NPF days to all days would help to address the frequency at different locations.

RESPONSE: The number of days available per year were added in parentheses next to the number of events.

Table 2: What is the variability of these numbers?

RESPONSE: The table has been updated to present the variability of the values.

Figure 3: What is the variability of GR?

RESPONSE: The figure has been updated to present the variability of the values.

Figure 4: Mean or median? If the latter, quartile range would help to address the variability.

RESPONSE: The text of the figure has been updated to explain what is presented. The word "average" was replaced by the word "mean".

Figure 6: Same comment as Figure 3.

RESPONSE: The figure has been updated to present the variability of the values.

Figure 7: same as above.

RESPONSE: The figure has been updated to present the variability of the values.