

Interactive comment on “Aerosol measurements at the Gual Pahari EUCAARI station: preliminary results from first year in-situ measurements” by A.-P. Hyvärinen et al.

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Response to anonymous Referee #1

We would like to thank the referee for the constructive comments. We agree that the data coverage of the first year was rather poor. Even though the paper was first meant as an introductory paper of the station, we have now appended it to cover the in-situ measurements of the whole campaign. The title has been changed accordingly. Responses to individual comments:

Major comments

C4301

1) The whole campaign has now been considered in the results and the manuscript has been revised accordingly. For the second year, the data coverage was much better, even though the particle size distribution measurements (DMPS) still suffered from several data gaps. At the moment we have decided not to include LIDAR or Cimel measurements in this paper, as another paper is being prepared on the matter. We feel that this data together with a detailed analysis and discussion deserves a full attention rather than being dubbed in the first paper from the site.

2) A typical aerosol size distribution has now been considered for the division of different modes. According to average size distribution from the site at different seasons they are now: nucleation mode from 4 to 25 nm; Aitken mode from 25 to 75 nm; accumulation mode from 75 nm up. The results and text in the manuscript has been revised accordingly.

3) While we agree that a clustering approach does give additional information to the source region analysis, we are reluctant to start a completely new analysis from the scratch. From our point of view, a sectoring is another commonly used method to analyze the trajectory occurrence. We would like to point out, that all our analysis is based on the time that each individual trajectory spends in different sectors on the whole trajectory path so we are not merely looking at arrival directions. This way, each trajectory does provide statistical input to all the sectors it passes during its arrival, and no information is lost. We have provided more details in the text now about the trajectory analyses.

Detailed comments

P 9017, I 3: “it is Asian Brown Cloud” - this is corrected, according to reviewer 2 suggestion to “atmospheric brown cloud”

P 9018, I 19: “How did you control RH for the PM samplers?...” - as stated on page 9018, standard heaters are used to control the RH in PM samplers. The heaters try to maintain the RH inside the measurement head at a maximum of 40 % RH. In practice,

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especially during the rainy season, the RH is between 40 and 60 % RH, sometimes approaching 80 % RH. As the reviewer mentioned, this is because the outside temperature is often above the lab temperature and the ambient dew point is very high. The lab temperature was kept at an elevated 26-28 C to reduce possible condensation. We have looked carefully into the data and it seems that the high RH's do not affect the mass measurements unless the RH simultaneously exhibits a large gradient. As a precaution we have omitted data if RH in the sampler is above 80%. All this leads to the heater temperature occasionally to be at a maximum of 75 C (not the tube flow temperature, which is lower than that). At 75 C a fraction of semi-volatiles will certainly volatilize. However, the fraction is heavily dependent on the composition of the aerosol and at the moment there is not enough knowledge to make any estimation of the volatilized fraction. We would like to point out that the PM measurements conducted at Gual Pahari represent a standard on-line method planned to meet the U.S. and International Particulate Monitoring Regulations, so the data should be comparable to any other ground based in situ measurement.

P 9019: "can you clearly state how big fraction of data was removed or was not available for each instrument?" - the campaign time averages of data coverage are now provided in the text. Additionally, Figure 4 shows the reader when the gaps actually took place.

P 2021: "based on the map provided in the article, Sector influence by Delhi is 300 deg – 60 deg, but discussions around figure three does not support is. - we agree, and discussion has been changed accordingly

P 9022: "can you show also standard deviation everywhere where you provide mean values for various parameters?" - this is now done, and data can be found in new Table 2. Due to rather strong diurnal variation, the standard deviations are large.

P 9022, I 20: "I suggest the authors to use BCe terminology. . ." - we have now included BCe wherever the measurements done with MAAP are considered.

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P 9023, I20-22:" How can authors be so confident about the occurrence of nucleation if data coverage is so bad?" - We did not want to imply that our observations would necessarily be valid outside the times covered by measurements. This is why we have stated:"when information about the nucleation mode was available. . ."

Fig 4 and discussion in section 3.3:"Measurements are very sparse and with large data gaps. . . . this part should be combined with measurements from 2009, re-analyzed or removed from manuscript." - Year 2009 is now combined in the analysis, and no major changes to discussion needed to be made. Even with the large data gaps in 2008, there were typically at least some instruments measuring simultaneously. We made efforts to treat the aerosol as a single "state" in the discussion and Fig 4, rather than dealing with different properties separately. This way, the different data could be assimilated and seasonal trends for the aerosol could be discussed; even if separate properties did not have enough data to justify discussion of trends.

Fig 7b and page 9025:" I do not see any decreasing trend. On what arguments authors base this claim?" - To clarify, we have added: ". . .decreasing trend towards the rainy season". After adding year 2009, the trend still exists.

Section 3.4:" This part should be strengthened with data from ceilometers and lidar, which are available" - we agree, but would like to leave this for a detailed study in the next paper which is in preparation.

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