Reply to Anonymous Referee # 2

Comments

This manuscript reports on results obtained from a pilot study connecting fluoresnce and CCN activity of urban aerosols in San Juan, Puerto Rico, which are interesting.

In the title "Measurement Report" could be removed

Response: The “Measurement Report” is included in the title as per the Journal instructions to categorize the different manuscript types. We will remove this from the title in the revised manuscript if the editor concurs.

Sentence structure and grammar needs to be checked, for example, lines 19-20, 275-277, 300-301

Response:

Sentence and grammar structure of the following sentences were changed in the revised manuscript

Lines 19-20: Many types of atmospheric aerosols cloud condensation nuclei (CCN) capable of activating as cloud droplets.

Changes to: Many atmospheric aerosols are cloud condensation nuclei (CCN), capable of activating as cloud droplets when the relative humidity exceeds 100%.

Lines 275-277: The CN concentrations show systematic, daily trends that reflect the motorized vehicle traffic and nearby residential emissions, the latter mostly from cooking.

Changes to: The CN concentrations show systematic, daily trends that reflect the emissions from motorized vehicle traffic and nearby residential heating and cooking.

Lines 300-301: The CCN concentration shows an increasing trend throughout the day, reaching its maximum around 4 pm, five hours after the peak in the CN.

Changes to: The CCN measurements show a trend of increasing concentrations early in the morning but does not start its rapid increase until midday peak, then it begins increasing until reaching its peak around 4 pm, five hours after the CN peak. Prior to the afternoon peak, there are smaller peaks that occur at 2 am and 8 am.

lines 161-162 - explain why absolute size of particles is not a factor in the current analysis

Response: **The** WIBS NEO, like all single particle, optical spectrometers, measures what is designated an “equivalent optical diameter (EOD)” that is defined as the size of a particle scattering the equivalent intensity of light as a spherical particle with known refractive index. Given that bioaerosols, dust and other types of environmental aerosols are not spherical, and that we don’t know their refractive index, the geometric size can be estimate to, at best, ±20%, hence relative size is more relevant than absolute size.

line 168-170 - needs to be rewritten, more clearly

Response:

Line 168-170: A series of heaters are controlled to maintain a temperature gradient from cooler to warmer as the particles move down the chamber. The difference in diffusion rates between heat and water vapor creates a supersaturated environment at the centerline of the cylinder.

Changes to: A series of heaters along the column are controlled to maintain a temperature gradient from cooler to warmer as the particles move down the column. Since water vapor from the wetted column diffuses to the particles faster than the heat, a supersaturated condition is maintained that is determined by the temperature gradient and flow rate.

line 262 - met parameters are collected at about 800 m away from aerosol measurements, is it a concern? Will the distance between the two measurements infleunce the inferences/results, explain

Response: Although having meteorological sensors at the site would have been ideal, given the flat terrain and no local sources of heat or humidity, there is no reason to believe that the measurements reported 800 m from the research site would be significantly different from conditions at the site.

lines 275-280 - comment on the reasons for differences with other results

Response: The differences in CN concentrations between the measurements at the university site and previous measurements are related to the geographical locations and average climatic conditions of the other regions discussed. The measurement site (Facundo Bueso) is an urban location influenced by emissions from vehicular traffic, vegetation, and other human activities such as heating and cooking. The CSJ is a remote coastal location where the atmosphere is relatively clean, influenced by marine aerosols or long-range transported aerosols. The PDE is a mountainous region that has a significant influence of aerosol from the nearby vegetation and from particles transported from marine boundary layer.

line 318 - why ABC type is quite large and dominates the FAPs during a particular time, explain

Response: Our observation suggested that ABC types are the Basidiomycetes fungal spores which are more frequently released into the atmosphere. The intradiurnal variation is due to the humidity dependent release of the basidiospores (the most common fungal spores in the outdoor air of PR).

line 328 - any specific reason for the diurnal variaion in FAP size distribution? Is it due to met parameters, explain

Response: Yes, Met parameters are highly correlated with the number and size of FAP particles. This is clearly indicated in fig 6a and 6b, where nighttime increase of RH (>80%) under low wind speed appear to be related to the released of fungal spore (e.g., Basidiospores and Ascospores) and their

growth due to condensation. Other studies at other locations have found similar correlations and the biological community is well aware of the link between spore release and high humidity.

line 353 - explain why larger increases at EODs larger than 2 µm. Make a conclusion statement.

Response: Here larger shifts of EOD refer to ABC type FAP. These are most likely the Basidiospores whose size increases with the increase of RH in the nighttime. Based on the referee's suggestion, We will clarify this statement in the conclusion of the revised version.

line 371 - explain the role of asphericity, and also its impact on FAP/non-FAP when it is low or high

Response: The asphericity factor roughly estimates the shape of the particles. In theory, perfectly spherical particles exhibit an AF value of 0, whereas an AF value close to 100 indicates a fiber-like, columnar-shaped particle. We observed higher asphericity for non-FAP than the FAPs indicating the non-FAP particles were relatively non-spherical. The impact of asphericity on the FAP and non-FAP is not well known and requires further studies which are beyond the scope of this pilot study.

line 388 - these inferences should be connected to the results discussed earlier, and the same or meteorolgy data also

Response*:* We will do the required modifications suggested by reviewer in the revised manuscript.

Figure 6 - how can FBAP Dmvd is high and low at the same RH? Explain. Similarly, FAP increases as RH increases in general, but this function is not clear as there is a spread at aroun 80% RH, explain

Response*:* We apologize for the typographical error in Fig. 6b. The FBAP should be FAP which will be corrected in the revised version. The increase of FAP Dmvd and the number concentrations depend on the hygroscopicity of the particles. Among the different FAPs measured at the site, the ABC, AB, and AC types were observed to have systematic diel patterns and were believed to be more hygroscopic than others. Therefore, the Dmvd and FAP number concentrations were increasing when RH reaches 80% and above. The other spread of points at >80% RH were possibly the less hygroscopic FAP types such as the A, B, C, and BC, not showing any increasing trend in Dmvd and the number concentrations.