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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Using flow cytometry and light-induced fluorescence technique to characterizethe variability and characteristics of bioaerosols in springtime at Metro Atlanta, Georgia" *by* Arnaldo Negron et al.

Anonymous Referee #2

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This manuscript describes a protocol to investigate bioaerosols and compare different techniques. The authors use flow cytometry (FCM) protocol to identify different population of DNA-containing particles such as Low Nucleic Acid- content particles (bioLNA), High Nucleic Acid-content particles (HNA) within atmospheric bioparticles. They applied the protocol to study diversity and population of bioparticle in the Atlanta metro during various meteorological conditions. Further they access performance of Light Induced Fluorescence (LIF) for Fluorescent Biological Atmospheric Particles (FBAP) detection with FCM and Epifluorescence microscopy (EPM) techniques. The authors also

used a Wideband Integrated Bioaerosol Sensor (WIBS) and compared with FCM. They did not find any correlation between FBAP and bioLNA. In general, they suggested that it is challenging to detect bacterial cells. They found that HNA size distribution dominated by 3-5 micron particles and observed mostly high humid condition (RH>70%), suggested that HNA particles most likely correspond to fungal spores, probably wet discharged spores. While LNA size distribution ranges between 2 and 4 micron. The authors suggested that bacteria may contribute to the LNA particles.

Overall, the manuscript is quite detailed but some of the discussion of the results needs substantial improvement. The manuscript can be significantly improved by reducing some of the unnecessary detail of the techniques/comparison and irrelevant introduction part and by discussing the findings in coherent way. The authors should focus more on the science part. For example, the authors discussed correlation between techniques but in my opinion, the overall story is missing. Some of the claims need more support or better discussion. For example, detection of bacterial cells and pollen fragmentation using different methods are not convincing. Also the authors investigated diversity of bioparticles at different meteorological condition. They could look at the histograms of the relative humidity and temperature and see if there is any relation with the fungal spores or pollen fragments. Then the size distributions will help to understand at those conditions and relate to different bioparticles. Some suggested clarifications are listed below.

Line 510: LNA size distributions are dominated by 2-4 μm particle. Authors suggested that bacteria can contribute to this group. Are you sure about that? I believe bacteria are smaller in size. Line 497: Authors discussed about pollen cluster of the FCM results in Figure 2. It is not clear to me the pollen cluster. I don't see a clear cluster. Line 527: The authors suggested that pollen fragmentation will have negligible effect on LNA concentrations. However, previous studies suggested that pollen grain can rupture into many fragments. I am not sure about Ragweed pollen but different species of pollen rupture at high humid condition. If FCM protocol is used as a tool for detection

and quantification of bioparticle in other location where different species of pollen are present. Then how should we interpret the FCM data? Line 532: How did you compare the pollen concentrations and LNA concentrations? Line 539: How do you get the size information in Figure 2? Discussion of figure 2 and 3 needs improvement. Line 560: is it possible that “unclassified” bioparticles contribute from secondary bioparticles such as fragments from fungal spores and pollen? Fragmented particles might have broad size distributions and may change their chemistry?

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