Negron et al. submitted a manuscript titled “Using flow cytometry and light-induced fluorescence technique to characterize the variability and characteristics of bioaerosols in springtime at Metro Atlanta, Georgia.” This manuscript presents a SpinCon/FCM protocol to identify and quantity bioaerosol populations and compares parallel data from an aerosol cytometry instrument (WIBS-4A). The research topic addresses emerging needs to improve the detection and identification of bioaerosols, which has an impact on several applications/communities. In general, I support the publication of this manuscript with some edits. There are suggestions for specific additions below, including some possibilities for added discussion and some suggestions.

Minor Comments:

- I suggest taking out the third paragraph entirely, lines 92-102. It doesn’t seem to fit or add value in this section.
- Line 108- add the word “continuous”
  “[…] frequency measurements (~1 Hz) which make it ideal for ***continuous*** monitoring and […]”
- Lines 214-216: "[…] SpinCon has a better performance (product of the flow rate and the sampling efficiency) than any impingement sampler due to its high volumetric flow rate, which make it more suitable for bioaerosols detection (Kesavan et al., 2015).”
  The above statement is strong- cyclones are known to induce stress onto bioparticles and if identification and quantification is done by culture-based methods, then your collection process may result in low viability of the bioparticles collected. I suggest rephrasing this statement. I think the data comparison between the SpinCon/FCM and WIBS should be carefully reviewed.

Figure 3: I suggest using the same color scheme as Perring et al. 2015 for you WIBS information- this helps the WIBS community easily see the correlations between the particle types.

Major Comments

- Lines 520-522: Can you give more quantitative information on the differences of HNA concentrations on days 4/9, 4/22 and 5/15 compares to days with RH> 70%.
- Lines 639-654: As you mentioned in the introduction, fluorescence is size dependent- how is this factored into your analysis? You mentioned that Pollen > HNA> LNA-AT regarding fluorescence intensity, this is also true for the sizing of these particle assignments.
- Section 4.3: I think this section needs to consider the caveat of the collection approach of the Spin Con/FCM system vs the WIBS. As mentioned, the Spin Con is a cyclone collection approach, and therefore particles are subjected to a liquid, which can impact the fluorescence characteristics of a given particle depending on its chemistry. Whereas with the WIBS, the particles are not being ‘collected’, but rather just detected and is based on sheath flow. As a result, the fluorescence characteristics of the particle are not altered by 1) a harsh collection approach and 2) collection medium.
- Conclusion: are the authors suggesting that SpinCon/FCM provides better detection/identification than UV-LIF techniques? Given the caveat of the stress that the SpinCon induces on bioaerosols during the collection process- can this statement be made? Can the authors clearly state the advantages of the SpinCon/FCM over the current UV-LIF technology? What sparked the interest of the authors to use this introduced technique? Overall, I think this is an interesting study, however, I think the authors need to make it clear that this is a *complementary* analysis that the WIBS/UV-LIF may not provide. I do not think this is an

alternative approach to the detection/identification of bioaerosols, as I think there is more to explore with this technique.

Figure 2: From my understanding, Figure 2 displays fluorescence intensity versus particle shape information. What conclusions can the author draw from the information on this graph, for e.g. the intensity increases as the particle shape increases (not sure what an increasing SCC-A value means)- please explain more. In the WIBS-4A, there have been concerns/questions to how reliable the shape parameter. For e.g. the spatial alignment of the collection options (forward vs the 90 degree), the dynamic range of the detection, and even the angle at which a non-symmetrical particle hits the laser. The phrase "internal complexity" is a bit confusing when talking about the particle sphericity/shape- I suggest changing this phrase. Also, please explain in more detail what a higher value for SSC-A means- does it mean it is more spherical? Less spherical? And how does this help your suggestion on the populations/particle types you assigned in Figure 2? Overall, I suggest explaining more about the SSC-A parameter in FCM. Are you suggesting that pollen particles are more spherical than PSLs? Again, I think the SSC-A values need to be discussed in greater detail.

References:

1. Gabey, A. M., Gallagher, M. W., Whitehead, J., Dorsey, J. R., Kaye, P. H., and Stanley, W. R.: Measurements and comparison of primary biological aerosol above and below a tropical forest canopy using a dual channel fluorescence spectrometer, Atmos. Chem. Phys., 10, 4453–4466, https://doi.org/10.5194/acp10-4453-2010, 2010
2. Kaye, P. H., Aptowicz, K., Chang, R. K., Foot, V. E., and Videen, G.: Angularly resolved elastic scattering from airborne particles, Optics of Biological Particles, edited by: Hoekstra, A., Maltsev, V., and Videen, G., Springer, New York, USA, 31–61, 2007.