Anonymous Referee #1

For efficient exchange we have copied the review text below in black font and have responded to each section directly, offset and in red font.

This manuscript presents a significant amount of data about fluorescent biological aerosol particles from two different regions. I am enthusiastic about the recent outcomes in the bioaerosol research and I am convinced that this manuscript will contribute to the recent discussion about the variability of the biological aerosol numbers in the atmosphere. I strongly recommend publication in ACP after discussing some important points and improving the quality of the manuscript mainly from the point of view of data presentation.

We thank the reviewer for his/her comments and for the recommendation to publish the manuscript after improving aspects addressed below. Indeed, we feel that the manuscript is much improved after processing these suggested changes.

Specific Comments:
There are several points I would like to discuss here and I am convinced that this discussion will help the authors to improve the quality of the manuscript from several aspects. My general impression about the data analysis and presentation is rather positive. However there are some points I would like to draw your attention to.

- Since this study uses the same method like Huffman et al. (2010) did to detect fluorescent biological aerosol particles from the ambient atmosphere, I would suggest using the same or if possible similar units for i.e. integrated aerosol number concentrations or size distributions in the entire manuscript. Using same units will make comparison between different studies easier. Moreover I have experienced some difficulties during interpretation of some figures and I am convinced that these kind of problems arise owing to choice of different units for the same quantity. To overcome this difficulty I would suggest using cm-3 not only for Table 1 but also for all image plots, box-whisker plots and also for distribution plots. This is the case for Figure 3 (use decimal numbers and remove the factor 10-3, i.e., 0.04 instead of 40x10ˆ3), 4, 5, 6, S3, S4, S5, S7 and S8.

We fully agree with the reviewer. The occasional use of m^{-3} in the originally submitted paper was a mistake, and the units have now been made consistent (in cm^{-3}) through all figures, tables, and text.

- A second important point I would like to discuss is about the use of figure properties. I assume that the authors use some data analysis tools to interpret and present this large dataset. Therefore I do not think that it would be difficult to modify and if necessary to improve the quality of some figures. My specific comments on the individual figures you can find below.

P17136: If we look at the Table 1 and compare winter time measurements from Finland and Colorado sites we do not see any significant difference between NF,c concentrations (i.e., mean NF,c = 0.004 cm-3 in Finland; mean NF,c = 0.005 cm-3 in Colorado). However the corresponding image plots look completely different. What could be the reason for the major difference between Fig. S4(a) and Fig. S4(d)?

We are unsure of what the reviewer means with this comment. Figures S4a and S4d refer to the spring and winter patterns of $N_{F,c}$ concentration, respectively, but both refer to the Colorado site. Figures S3d and S4d compare the diurnal patterns of $N_{F,c}$ in Finland and Colorado, respectively, and show patterns on the same order of magnitude. The one error here is that the $N_{F,c}$ scale in Figure S3d should be $x10^{3}$ not $x10^{-3}$. Additionally, the image plot portion of Fig. 4d shows little information due to a zero threshold that was too high. This has been corrected, and the color range now reflects the information more clearly.

Technical Comments:

- Figure 1: First of all I would suggest splitting the y-axis for Finland and Colorado site (also for figures S1 and S2) and making mirror axis for both. Since open circles belong to (or related to) only Finland data you can move the circles upwards after splitting y-axis for Finland and Colorado.

These suggestions were processed as requested. Figures 1, S1, and S2 have been slightly modified for aesthetic changes.

- Figure 2: Increasing the line thickness for box- whisker plots may improve the appearance and increase the readability. Axis label for the ratio plots (Figure 2c) should be corrected as NF,c/NT,c.

The line thickness has been increased as suggested and the axis label has been corrected.

- Figure 3: Increasing line thickness may provide a better readability and changing unit from m-3 to cm-3 may simplify this figure by removing the factor (103). Numbers need to be adjusted accordingly.

The line thickness has been increased as suggested and the units have been changed to cm^{-3} as discussed.

- Figure 4: Again using cm-3 may simplify image plots. In that case you will not need the factor 106 on y-axis (Figure 4, lower panel). Just remove 106 and change m-3 to cm-3 and adjust numbers for upper panel.

Suggestions were processed as suggested.

- Figure 5 and S8: I think these figures are rather small and difficult to interpret. It would be better if you could stack them up and enlarge to an order.

Figures 5 and S8 are now presented vertically instead of horizontally, as suggested.

- Figure 6: Change y-axis to cm-3 and rearrange the numbers accordingly.

Units were changed as suggested.

- Figure S4(d): What is the reason for the empty image plot? Is it because you do not have enough data points?

The white portions of the image in Figure S4d were due to number concentrations below an arbitrary threshold applied to the plot. The threshold and color scales were changed to better reflect the qualitative patterns.

- Figure S5: Is the Y-axis label correct? It is not entirely clear to me why you used N/dlogDa here? I would expect to see the change on FBAP concentration against temperature as you stated in the caption. Please check the units and decide whether you use cm-3 or m-3.

The y-axis label of Figure S5 has been corrected to $N_{F,c}$, as suggested.

- Figure S6: Here you mention about a "gray line" in each figures. However I can see only one black horizontal line. I would suggest combining Figure S6(a) and S6(b) by removing one of the X-axes, since they represent the same quantity. After that you can split again Y-axis for figure S6(a) and S6(b) and provide the mirror axes for both. In this way you will need only one label for Y-axis (split into two parts) and one for X-axis.

The reference to the gray line in the figure caption line was corrected to refer to the black line instead. We chose to leave the y-axis labels in place for each panel, because we felt it was clearer in this case.

References:

- Huffman, J.A., Treutlein, B., and Pöschl, U.: Fluorescent biological aerosol particle concentrations and size distributions measured with an Ultraviolet Aerodynamic Particle Sizer (UV-APS) in Central Europe, Atmos. Chem. Phys., 10,