

Atmos. Meas. Tech. Discuss., author comment AC2
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Reply on RC2

Gian Lieberherr et al.

Author comment on "Assessment of real-time bioaerosol particle counters using reference chamber experiments" by Gian Lieberherr et al., Atmos. Meas. Tech. Discuss.,
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General Comment

The present study performed a direct comparison of three different bioaerosol devices (i.e., the WIBS-NEO, Plair Rapid-E, and Swisens Poleno) to assess their performance in counting and sizing aerosol particles, as well as their accuracy of their fluorescence measurements. The authors highlighted the different strengths and weaknesses of the three devices for the evaluated particle size range. This is well designed study and the manuscript is well written. The results are valuable for the aerosol community and provides important information for future studies. The manuscript can be accepted after the following minor comments are properly addressed.

Response: Thank you very much for the positive feedback

Minor Comments:

1. I do not see the point to have Table 3 and Figure 2 as they show the same results.

Response: It is correct that Figure 2 illustrates information from table 3. However, the value at 2 μm in Figure 2 is the average of the three 2- μm PSL values from table 3. This is also the case in Figure 1 illustrating the information from Table 2. We think that the figures help to understand the values from the tables. If the reviewer agrees, we suggest keeping the figures.

2. Figures 3, 4 and 6. I am wondering how many experiments were performed to get each PSD.

Response: The duration of the measurement sequences was about 20 minutes for each PSL and DUT combination (i.e. one experiment per size/fluorescence per instrument). To clarify this in the text we have added a sentence in section 2.5 at line 147:
"The number concentration measurements were carried out for each PSL, by connecting the DUTs one by one to the sampling outlet of the primary standard described in Subsection 2.1. Once the concentration was stabilized, the measurement sequences lasted for 20 minutes. The nominal particle concentration was set to ..."

3. Figures 7 and 8. I am wondering how many experiments were performed to get these figures.

Response: See response to comment 2 above

4. Lines 224-225: "appear at around double the nominal size". I consider that it is quite far from double. Can the authors be more precise here?

Response: We completely agree, the sentence has been changed to: " In particular the red PSLs appear at around 1.6 times the nominal size."

5. Lines 249: "is measured in all the three devices". I suggest to changes this to "two devices" and to add the text from section 3.3.1. I mean, I consider useless to have subsection 3.1.1.

Response: We suggest to change in line 249: "...is evaluated on the DUT's using three different PSL..."

We also agree concerning subsection 3.3.1. We have removed the title of 3.1.1, and then directly added the content from subsection 3.3.1. to the end of the paragraph.

(Subsection 3.3.1 was reformulated within the response to RC1 : "Since the WIBS-NEO only detects signals in 2 channels (310-400nm and 420-650nm) a maximum of two data points per excitation wavelength are obtained. One of these points is used to scale to the reference values, so only one value remains to evaluate the signal. No meaningful analysis is thus possible and no further assessment was performed for this device for fluorescence.")

6. Lines 250: "with 2 µm diameter". I am wondering why at this specific size only?

Response: The choice of particles was limited to the ones used in the reference dataset (Könemann et al.). The 2µm size had the advantage that all the suited colors were available in the same size. Furthermore, the overall number of experiments was limited as the measurements were time consuming (each measurement sequence had to be prepared carefully which added considerable overhead to the effective runtime).

Technical Comments:

Line 17 and along the text: I suggest to organize the references chronologically.

Response: Indeed, this will be adapted, thanks for the remark.

Line 26: Define WIBS.

Response: This has been added: ' WIBS (Wideband Integrated Bioaerosol Sensor)'

Line 41: Add a reference after "methods".

Response: We add the following reference:

Löndahl J. (2014) Physical and Biological Properties of Bioaerosols. In: Jonsson P., Olofsson G., Tjärnhage T. (eds) Bioaerosol Detection Technologies. Integrated Analytical Systems. Springer, New York, NY. https://doi.org/10.1007/978-1-4419-5582-1_3

Line 95: "(Forde et al., 2019)" should be Forde et al. (2019).

Response: Thank you for the remark. This has been modified as suggested.

Line 144: Add the model and manufacturer of the used fluidized bed generator.

Response: Thank you for the remark. We have added a parenthesis to the end of the sentence: '...using a fluidized bed generator (3400A, TSI Inc., USA).'

Line 146: Should "bioaerosol devices" be replaced by "DUTs".

Response: Thank you for the remark. This has been modified as suggested.

Line 148: Should "bioaerosol monitors" be replaced by "DUTs".

Response: Thank you for the remark. This has been modified as suggested.

Lines 200, 229 and along the text: Table(s) and Figure(s) should have a capital "T" and "F", respectively.

Response: Thank you for the remark. This has been corrected.

Lines 251: "(Könemann et al. (2018))" should be "(Könemann et al. 2018)".

Response: Thank you for the remark. This has been modified as suggested.

Figure 8: The panels are cut-off at the bottom.

Response: Unfortunately, we do not see the figure 8 being cut-off. Would it be possible to explain in more detail what the issue appears to be? Thank you.

Response: We thank you very much for your time and your valuable feedback.