This study reports the number concentration of fluorescing particles as well as the total supermicron (1-12 µm) aerosol particle number concentration at a rural site in Sweden over a period of 18 months. The authors employed the BioTrak monitor, which provides number concentration of viable particles as well as total particle number concentration in real time. Real-time bioaerosol monitoring is highly relevant for allergy/asthma prevention, for ecology (e.g. for monitoring invasive plant species) and for studying the effects of climate change (e.g. the growth/spread of vegetation towards higher altitudes or in the arctic region). This manuscript provides useful insight into the release of biological aerosol particles and their relationship to different meteorological parameters and falls well within the scope of the journal Atmospheric Chemistry and Physics. My main concern (see comments below) is that the performance characteristics of the BioTrak monitor are not known. Without any knowledge on the counting efficiency of the OPC module and the sensitivity of the LIF detector, it is impossible to assess how quantitative the results are. It is also impossible to compare these data to data published in previous studies using different monitors. Although this issue is certainly not specific to this study – instrument calibration in the supermicrometre particle range is for various reasons much more challenging than in the submicrometre range – it is still troubling.

In my opinion, the authors should provide some evidence on the performance of the BioTrak before this manuscript is accepted for publication.

Comments/questions

1) Page 2/Line 57: The authors argue that "Progress in the detection of bioaerosols with higher time resolution has been made by utilizing laser-induced fluorescence (LIF) (Hill et al., 1995)". Apart from LIF, new hybrid instruments have become available in the last 4-5 years, which combine different detection methods with machine learning. Such instruments include the Poleno (Swisens, Switzerland), the Rapid-E (Plair, Switzerland) and the BAA 300 (BAA 500, Hund GmbH)

Sauvageat et al. 2019 https://doi.org/10.5194/amt-2019-427

Šaulienė et al. 2019 https://doi.org/10.5194/amt-12-3435-2019

J. Schiele *et al*., "Automated Classification of Airborne Pollen using Neural Networks," *2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2019, pp. 4474-4478, doi: 10.1109/EMBC.2019.8856910.

These hybrid methods have shown very promising results in real-time bioaerosol identification and counting and seem to be more powerful than LIF alone.

2) Text: Please insert a space between L and min^{-1} (Lmin^{-1} -> L min^{-1}). Please insert a space before the unit ^{o}C (e.g. 10^{o}C -> 10 ^{o}C). Similarly, ms^{-1} -> m s^{-1}, gcm^{-3} -> g cm^{-3}, mmh^{-1}-> mm h^{-1}

3) Page 12/ Line 263: The name of the author is Lieberherr et al. (2021)

4) Page 12/Line 289: The authors argue that "the BioTrak should be run side-by-side with other supermicron particle counters, such as an aerodynamic particle sizer (APS, TSI) for inter-comparison of the supermicron particle counting". According to a recent study (Vasilatou et al. 2022 https://doi.org/10.1080/02786826.2022.2139659), APS units exhibit a significant unit-to-unit variability and the counting efficiency drops fast at particle sizes ≥10 µm. Moreover, it is not straightforward to compare the BioTrak, which is an optical particle counter, with an aerodynamic particle counter since these instruments classify particle size differently. It might make more sense to run the BioTrak side-by-side with other optical particle size spectrometers, e.g. the OPS 330 (TSI Inc, USA) or different OPSS by Grimm GmbH, Germany. OPSS tend to be more robust, therefore more suitable for field studies, and have been characterised more extensively in the laboratory.

5) Page 12: The authors state that "To further understand the potential of using the BioTrak in future studies, the BioTrak needs to be compared to other new technologies for automatic bioaerosol monitoring. Lieberherr et al. (2021) presented a potential standardized validation method for assessment of counting efficiency and fluorescent measurement of bioaerosol instruments that could be used for validation of the BioTrak instrument (Lieberherr et al., 2021)." I would like to note that there is a second method available for calibrating optical particle counters based on the Inkjet Aerosol Generator (Iida et al. 2013 https://doi.org/10.1063/1.4803302). This method could also be applied to bioaerosol monitors.

6) Considering that there exist at least two methods for calibrating optical particle counters, I am wondering why the authors did not attempt to calibrate their instrument before or after their field campaigns. I realise that the calibration of the LIF detector, which determines particle viability, is not standardised and that certified fluorescent reference materials are not commercially available. However, the calibration of the first detector/counter measuring scattered light should be possible with standardised procedures laid out in ISO 21501-4. Without any prior characterisation of the BioTrak, the results of this study remain in the best case semi-quantitative. That would be a pity, considering the great efforts and hard work that the authors invested in this lengthy field campaign.

   I strongly recommend that the authors provide some evidence on the performance (especially the counting efficiency) of the BioTrak. If it is not possible to send the instrument to a metrology institute or any other accredited laboratory for calibration, I suggest that you compare the BioTrak with a calibrated OPSS at your premises or in the field. In this case, the OPSS would be used as a transfer standard. Providing more information on the performance of the BioTrak will enhance the quality and impact of this otherwise very meticulous work.

Minor corrections and suggestions for improvement

Page 3/Line 77: Consider revising this sentence as follows "In the studies ~~here~~ listed here…"

Page 3/Line 81: Please insert a space between the number 10 and the unit µm

Page 12/Line 286: Consider revising this sentence as follows "However~~But~~, to understand these differences in more detail…".

Page 18 / Line 418: Consider revising this sentence as follows "Studies on long-range transport of air masses ~~was~~ were beyond the scope of this study but could have possibly contributed to ~~have had been indicative for~~ a better understanding of these data ~~fully~~.

Page 19 / Lines 426-428: Consider revising this sentence as follows "… a substantial increase of FBAP number concentrations was ~~were~~ observed before, during and right after rain… , the FBAP concentration was observed to increase by a factor of 4-10).

Page 21 / Line 478: Consider amending this sentence as follows: "Fluorescent bioaerosols were measured continuously in real-time during 18 months in the Southern Sweden using a BioTrak".

Page 21 / Line 500: Consider revising this sentence as follows "The data ~~here~~ presented in our study…".