



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-598-RC2>, 2022  
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## **Comment on egusphere-2022-598**

Anonymous Referee #2

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Referee comment on "Technical Note: Bioaerosol identification by wide particle size range single particle mass spectrometry" by Xuan Li et al., EGU sphere,  
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The Technical Note, "Bioaerosol identification by wide particle size range single particle mass spectrometry" by Li, et al. describes a bioaerosol identification algorithm for a single-particle mass spectrometer SPAMS. The details of the classification are the same as those in Zawadowicz, et al. (2017) (ratios of characteristic phosphorus and organic nitrogen markers discriminated in biological and abiotic species by use of the SVM algorithm), but this is a valid contribution to the literature because it reproduces the previous study on a different single-particle instrument with a different training dataset. Particularly, it is of note that SPAMS and PALMS use ionization lasers of different wavelengths, which would be the most significant reason for this method to work with one instrument and not the other. In this way, this study is also somewhat contrary to the recent Cornwell et al. (2022) paper, which argues that the phosphate-ratio SVM technique is too sensitive to laser ionization energy to work on the ATOFMS system, which uses the same ionization wavelength as SPAMS.

Overall, support the publication of this paper after the authors address the following comments. I will rely on the editor's best judgement whether this paper would fit better at ACP or AMT. My first instinct was to recommend resubmission to AMT, but I am not very familiar with the scope of the new Technical Note manuscript type, and reading ACP's guidelines it seems like it fits with "development of numerical algorithms for the interpretation of atmospheric data (such as statistical methods and machine learning)."

Overall comment: the paper would benefit from another read for syntax, grammar, etc. Some sentences are difficult to follow (some, but not all instances are noted below).

p.2, line 64-65: Not sure I follow this sentence, "However, the research on the detection and discrimination of bioaerosols from fungi and other bioaerosols remains insufficient". This reads like you are suggesting the need for increased speciation of bioaerosol detected by SPMS (i.e. discriminating fungal bioaerosols from other bioaerosol types), but this is

not further discussed in the paper, which focuses on discriminating between bioaerosol and abiotic aerosol.

Experimental section: can you provide some rationale for choosing these specific bacterial and fungal strains?

Bacterial and fungal strains that form the training dataset are discussed in the Experimental section, but road dust, exhaust and combustion products are not. Please provide some discussion of what types of abiotic phosphorus-containing species were used in the study.

p. 6, line 173: "Therefore, for the first time, HP-SPAMS was used to measure 10  $\mu\text{m}$  coarse particulate matter under the improvement of the sampling system." Can you provide some figures of merit for your new coarse-mode sampling system? What is the transmission efficiency at 10  $\mu\text{m}$ ?

At these high vacuum aerodynamic diameters, what is the laser hit rate? (i.e. what proportion of optically-detected particles produce a mass spectrum?)

p. 7, lines 178-193: It is not entirely clear if this paragraph describes previous investigators' results or your own. I found the sentence in lines 182-185 especially difficult to understand.

Figure 3: I'm not sure I understand what is indicated by the different colors in this figure.

It would be useful to include some discussion of method uncertainties in the paper. What are the limiting factors in translating the results of this lab-based study to the atmosphere?