

Interactive comment on “Improved real-time bio-aerosol classification using Artificial Neural Networks” by Maciej Leśkiewicz et al.

Anonymous Referee #1

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This manuscript details the use of an Artificial Neural Network, or ANN, to attempt to better identify bio-aerosol. Bio-aerosol has been a topic of contemporary interest in the atmospheric sciences and neural networks have gained prominence as a data reduction and analysis technique. This is therefore a paper that could be of interest to the AMT readership. There are however several large missing sections, e.g. aerosol justification and characterization, that should be addressed before it is publishable.

1. The writing of the paper is a bit too familiar and there are many unquantifiable terms, e.g. “Society is awaiting anxiously for system that could inform them in real-time about a real danger that is suspended in the air.” – this would be a rather improved paper if this type of writing could be toned down as in “There is a need for real-time information about ambient particulate matter.” 2. In addition, the paper could benefit from a

C1

through read from a native English speaker with a focus on removal of incorrect and non-scientific terms. Examples, but by no means comprehensive: “really promising”, “very high performance”, past tense of grind is ground, not grinded, etc. 3. The name of the technique to which the ANN is applied, BARDet, should be stated in the abstract. 4. The central issue with this paper is there needs to be a description of the aerosol generation method and the produced size distribution of each sample; some are solids, some are liquids. Were sizes comparable? Concentrations? Ideally this is a sub-section of 3.1.2. Going farther, why were these samples chosen? Some seem rather important e.g. pollens, while others are unclear. Paper towel? Multiple broths? It is upon the authors not to simply present so may aerosol types but instead (1) carefully and completely characterize the aerosol investigated – not only what they look like to the BARDet - and (2) to argue why they are being investigated (do they have any atmospheric importance which is the theme of the paper)? 5. Going a step further, although there are 48 aerosol types suggested, in practice the confusion matrix says the separation is based on 7 broader classes. If this is indeed the case (as it appears) then (1) the abstract should reflect separation of 7 classes, not the 48 stated (2) Table 1 should state what fits into each class, since this is the central concept 6. The statistic in Table 4 need to be placed in the abstract and repeated in the summary, these are the central results. For example, in Tables 4 and 5 it appears that there can be confusion on the 50th centile level. This is not altogether great separation and should be explicitly stated for the reader from the outset. The 48 types and 114k number of spectra, which are the data set, belong only in the methods section; while these seem rather impressive they are not results. The authors should therefore replace the sentences which repeat these values in abstract and summary with the separation ability. 7. Table 3 is overly simplistic for a table; this can be stated in a single sentence. Please remove. 8. In the summary : “This study proved that it is possible to create a tool for a highly effective analysis of bio-aerosols using multiple ANNs combined into decision tree.” – this is again an unquantified statement. It is also at odds with “Tests revealed that only several substances have such characteristic fluorescence spectra that allows correct

C2

classification of almost each particle. However, in all other cases the system was able to recognize a particular aerosol cloud.” Please provide the separation ability and then let the reader judge if this is a highly effective analysis. 9. Why weren't non-biological materials tested?

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