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Comment on acp-2021-57

Anonymous Referee #2

Referee comment on "Disparities in particulate matter (PM_{10}) origins and oxidative potential at a city scale (Grenoble, France) – Part 2: Sources of PM_{10} oxidative potential using multiple linear regression analysis and the predictive applicability of multilayer perceptron neural network analysis" by Lucille Joanna S. Borlaza et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-57-RC2, 2021

Bolraza et al. is an interesting manuscript that tested the use of neural network analysis to apportion OP sources in PM10. The manuscript is well written but highly dependent on the companion paper. In reviewer's opinion, there should be one paper by merging this one with the companion paper. In any case, there are many important points in this paper those need to be clarified and addressed before merging it to companion paper or accepting it as an individual publication, depending upon the Editor's decision.

Major Comments:

Objectives (Lines 85-88): The objectives of this MS are not satisfactory because this paper can't stand alone. Without companion paper, one can't understand this paper. This is a major draw back. There can be part 1, part 2, etc. of the paper complementing different aspects of a given topic, but each part should also be able stand alone.

Section 2.3

Lines 127-129 : Insoluble particles can be a large source of uncertainty, as they are not uniformly mixed in the solution. They can interfere with spectrometric analysis via physical absorbance.

Lines 134-135: This suggests the precision of the measurements. How do you ascertain the accuracy of the measurements for each assay?

Lines 144-146: How do you ensure the uniformity of insoluble particles in each well? This needs to be clarified.

Lines 155-160: DCFH output is often reported in the form of equivalent H_2O_2. Here is is reported as nmol/min/m3. Authors shall provide the details, and also show the linearity in H_2O_2 formation as a function of time before using this unit.

Lines 205-206: In the algorithm, what was criterion of determining the number of neurons in the hidden layer?

Line 217: What is the rationale behind choosing 80% and 20% only?

Lines 229-232: Was the output unique for given input parameters? Or, different input parameters can give same/similar output?

For example: If MLP gives OPv value 'x' for a% of BB, b% of Primary traffic, c% of Mineral dust, d% of Industries, and so on, then, can i% of BB, j% of Primary traffic, k% of Mineral dust, l% of Industries, and so on, also give the same output value (x) of OPv? How do you check whether the ouput is unique or not?

Lines 272-274: What could be the reason for the observed correlations between different assays when they are known to respond to different species? Can you make an inference that one can use only a particular assay rather than all the three assays?

Lines 281-283: This is very important point of the paper but not clear at all. Mass-normalised assays obviously depend upon the PM composition and not the PM mass. Different assays respond to different species. The statement written in lines 281-283 is confusing. Please elaborate this sentence in detail.

Fig. 5: BB is not contributing to OP-DTT as much as it contribute to OP-AA and OP-DCFH. This is unexpected as OP-DTT is most responsive to organics. Please explain.

Lines 345-355: Why industrial (or other) sources are responding differently to OP at different sites? Explain.

Lines 512-514: "Redox characteristics of commonly unresolved sources were obtained" - What does that mean? Elaborate it further.

General comment:

How the OP-DTT, OP-AA, and OP-DCFH of PM10 observed over the study regions compare with the other parts of the world? This should be included and discussed.

Minor Comments:

Line 15: This is a strong but invalid statement. OP doesn't quantify anti-oxidant imbalance because as of now there is no assay available which respond to all the redox-active species present in PM.

Lines 49-51: Give a proper definition of OP.

L279: Are these relationships significant? Provide p values of each R.

L325-327: What could be the reason that MLR could not capture high OP events?