

Revision of “9-year trends of PM10 sources and oxidative potential in a rural background site in France” by Borlaza L.J. et al.

General comments

This work presents the results of long-term monitoring and characterization of sources of PM10 and their contribution to the Oxidative Potential at a rural French site. The work is interesting and generally well written. However, the paper could benefit of some revisions.

First of all, the analysis of the variability of PM10 concentration (Section 3.1) focuses on just reconstructed PM10, and it is not clear how much of the measured mass is efficiently reconstructed. In addition, the analysis covers only yearly averages and therefore interannual variability, while a focus on seasonal and perhaps subseasonal time scales could be interesting as well.

Secondly, the information reported on the choice of the PMF solution is not complete, and as such it is not possible to judge if the choice was done appropriately.

As a third point, the STL analysis is applied to all factors, but Figure 6 focuses only on the traffic factor: however, it is interesting to note that papers analysing long term trends at high-altitude or regional background sites (in some cases even less impacted by anthropogenic sources than this particular site) have indicated an important role of changes in meteorology for the observed decrease in PM10 in the last decades. This would be very interesting to analyse here as well, because it could indicate that the role of control policies in driving PM10 decreases was sustained by meteorological changes. As such, this investigation could complement nicely the findings presented here.

Below I present an additional list of specific suggestions to improve the overall quality of the work.

Specific comments

Pay attention to similarity matrix and check if you can rephrase parts that look similar to other articles.

Line 15: A specification of the name/location of the site could be given in addition.

Line 17: Change “from” to “analysed on”.

Lines 19-22: The difference between the two sentences is not straightforward and clear. Could you please rephrase and make the difference clearer?

Line 24: But this is not a result of this study, since you did not analyse urban areas.

Line 25: Change “However, this” to “even though this”

Line 26: Change “signal” to “indicate”.

Line 29: This sentence is not clear: revise.

Line 30: Change “on chemical characterization and sources of PM” to “PM chemical characterization and sources” and “is concerned” to “focuses”.

Line 31: Delete “as they are the places”.

Line 33: Change “done” to “carried out” and delete “to try”.

Line 34: Change “could” to “can”.

Line 35: “geochemical” may be not the most appropriate term in this context. In addition, the pollutants are transported, not the sources. Please revise.

Lines 34-35: This sentence is not clear: could you please rephrase it?

Lines 36-37: Well, not only large-scale processes, but also mesoscale processes are needed for chemical transport models. Revise.

Line 38: Again, “geochemical” is not the appropriate term in this context.

Lines 43-44: Please rephrase as “However, only few sites provide long-term in-depth series of PM chemical speciation data.”

Line 46: Delete “would”.

Lines 47-48: Change “the case of the oxidative potential (OP) of PM” to “the case of PM oxidative potential (OP)”

Line 52: Change “see” to “analyse” or “investigate”

Line 53: Add “the” before “efficiency”.

Line 55: Change “measurement” to “measurements”.

Line 56: Change “large filter” to “long-term filter”

Lines 55-60: I would suggest presenting the structure of the work rather than summarizing the results and conclusions.

Line 63: The acronym was introduced previously without explanation: better move this explanation to the first time it is cited.

Line 66: Change “a good” to “considered representative”.

Lines 63-68: Any additional description of the typical local climate? This can affect PM concentrations and may be relevant for the rest of the discussion.

Line 67: Add “at this site” after “chemistry”.

Lines 75-78: This means that you analysed only field blanks and not blank filters? With which frequency did you analyse these field blanks?

Line 89: What is this “range of ratio”? Please explain better.

Lines 83-111: Any specifications of the Limits of Detection, and other experimental parameters?

Line 109: Change “includes” to “including”.

Lines 115-116: If the analysis was started on samples collected from June 13, 2017 to December 22, 2020, it means that then you analysed also the rest of the samples. Is this true? If not, please revise.

Line 139: Change “PMF 5.0” to “EPA PMF 5.0”.

Line 140: This definition is not correct: please revise.

Lines 147-148: Which paper did you follow for this step? And do you know that this is not complete to characterize the strength of the variables? The analysis of the residuals should be also made. In addition, how did you treat the additional uncertainty? Please revise.

Lines 150-152: How did you analyse weighted residuals? Please provide additional details.

Line 159: Change “in” to “with”.

Line 164: Change “difference” to “differences”.

Lines 164-171: Did you use any particular software for this calculation?

Line 182: Add “used” after “that”. It is not clear if there are any differences with that methodology or not.

Line 201: Change “discusses” to “discuss” (twice).

Line 204: What does it mean “reconstructed”? How far is this reconstruction from the measured value?

Line 205: Is the value after the “±” the standard deviation? Please specify.

Line 210: Delete comma after “although”.

Lines 211-212: A decrease during this period is quite evident, while the change in composition is less evident.

Line 215: Is this a mean value? From Figure 2 this value does not seem constant.

Lines 219-220: This example does not explain much. Please revise.

Lines 220-221: This sentence is not well linked with the previous results shown. Please revise.

Lines 223-225: Please provide additional details on how this solution was selected. The signs of instability are worrying.

Lines 233-235: Couldn't you use a value more appropriate for a rural site?

Line 249: Change “lead” to “have led”.

Lines 263-265: But local sources cannot be excluded: if not, we would have always higher nitrate and sulphate concentrations at rural sites than at urban ones, which is not the case.

Line 270-271: Can you explain the reasons of this seasonality in these 2 factors?

Line 281: Change “were” to “was”:

Lines 296-297: Couldn't this be due to the fact that Na⁺ and Mg²⁺ are primary seasalt particles while MSA particles are secondary? What about the correlation with nss-SO₄²⁻? See for instance papers from the group of Silvia Becagli and Roberto Udisti (e.g., Udisti et al., 2016; Becagli et al., 2019, 2021). Did you try to analyse the source (with wind or back-trajectories)?

Line 305: Change “typologies” to “sites”.

Line 332: Change “dissimilarity” to “dissimilarities”.

Figure 6: Check the y-scale (measurement unit).

Lines 371-382: There are also studies at high-altitude or regional background sites, some of which highlighted a concurrent role of a changing meteorology and of a change in the frequency of Saharan dust advections to Europe. Please look at: Tsyro et al., 2018; Colette et al., 2011, 2017; Brattich et al., 2012, 2020 and references therein). Thus this discussion may be improved.

Figure 8: Please check the x-axis and add more ticks. There are some peaks in all series: did you analyse the presence of outliers and investigate their causes?

Line 457 and 458: Delete “as much as”.

Line 475: Check the reference to the Figure.

Line 476: Add “in” before “Figure”.

Line 482: Change “confident” to “confidence”.

Line 484: Change “follow” to “follows”.

Lines 511-514: This is not clear: the problem with weekly samples should be that differences and transient events (e.g., Saharan dust, fires, ...) are smoothed but I cannot understand what you mean by “the weekly collected samples may contain particles that are not fully captured in a daily sample”.

Line 530: Figure 11 is not about PM concentrations, but on OP contributions. A decrease in PM concentration could instead be observed as previously noted.

Line 546: Change “this” to “the”.

Lines 548-550: As previously noted, this discussion is limited since there are studies evidencing a simultaneous effect of the changing meteorology. This point should be improved.

Code and data availability: Please check the statement for this: as on the ACP website https://www.atmospheric-chemistry-and-physics.net/policies/data_policy.html, “Authors are required to provide a statement on how their underlying research data can be accessed. ... If the data are not publicly accessible, a detailed explanation of why this is the case is required. ... Data do not comprise the only information which is important in the context of reproducibility. Therefore, Copernicus Publications encourages authors to also deposit software, algorithms, model code, video supplements, video abstracts, International Geo Sample Numbers, and other underlying material on suitable FAIR-aligned repositories/archives whenever possible”