

Second 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

The authors have replied to most of the comments raised by the reviewers. However, I noticed that in some parts the reviewers expressed similar concerns, and the reply from the authors is not always totally satisfying. This for example applies to the effect of meteorology on the trends investigated. Meteorology have a clear and dominant influence on most of the identified factors, and the signal is not always a seasonal effect as stated by the authors. This is never investigated or mentioned in the paper. There is no effort in studying how for instance transport drives the time pattern of some factors. Also, the STL deconvolution shows which are the main component(s) driving the temporal pattern of PM10 and of the different factors: the authors never try to investigate whether the trend reconstructs or not the most part of the signal, and use this analysis solely for the purpose of identifying the presence of a trend in the time series. The original scope of the STL analysis is to decompose time series splitting time series into trend, seasonal and remainder component, and not to obtain and quantify trends which is the step further and needs other types of analysis. In order to investigate the presence of trends, other methods are more appropriate; conversely, this method is really to quantify how much of the signal is due to each of the three components. While in general I would recommend to provide more references to understand how the presented trends are obtained, I would recommend to make an effort so as to make this analysis more complete going in the direction of what all the reviewers have previously commented. In view of these comments and seeing the reduced efforts to align to the requests of the reviewers, my recommendation is for major revisions of this paper.

Specific comments

In many cases, I do not understand the revision in the tracked change version since there is no or very small change with respect to the original version and the deleted sentence is just the same as the newly introduced one.

Lines 34-35: This sentence is not clear: rephrase.

Line 39: and what about aerosol transport apart from its formation?

Line 45: well, it is quite restricting to say that the understanding of such processes is only related with the “elaboration” (perhaps also not the most appropriate term) of chemical transport model.

Lines 47-48: This is a general characteristic of the long term time series, and not just of the ones collected at background sites.

Lines 71-73: This detail is not needed at this point.

Lines 69-77: The scopes are very specific and citing already methodologies which happen to be still rather obscure to the reader. Please try to generalize the objectives leaving the details of the methodology for later on in the text.

Line 140-141: Absolutely not clear how you reconstructed PM10.

Lines 142-144: This detail is not useful here, as the reader does not know anything of this comparison.

Lines 206-207: There are other reasons to increase the uncertainties of some variables (indicating them as weak) or excluding them from the analysis; I assume that this has been considered. also, have other sources of uncertainty (e.g., flow rate) taken into account?

Line 211: How did you take into account the weighted residuals distribution? I mean, could you explain how you analysed it, such as you did with the Q/Q_{exp} ratio?

Lines 265-284: Which software or code did you use to apply this analysis?

Lines 266-268: I cannot understand this: meteorology does not have only a seasonal signal, and also how can the interannual variation in the seasonal signal be connected with the effect of meteorology? If you have references, please provide them, because this justification is not convincing.

Line 298: To be true, I can observe also a reduction in NO₃⁻ and NH₄, which should be among the main chemical species. So I still cannot understand this.

Lines 299-301: Can you explain at least tentatively the reasons of such differences?

Line 378: A part of sulphates has a marine origin.

Lines 384-386: And what about the sulphates to Na⁺ ratio? Did you observe if there is a particular wind direction for this factor? Or reasons to suspect collinearity? Or any other investigation on this factor which could be also a mixed source?

Lines 388-390: And what about the ratio of Cl⁻ to Na⁺? Is there chlorine depletion?

Lines 413-416: And what about your study?

Lines 417-424: Any particular temporal pattern for this factor?

Line 432-434: Also here, any particular temporal pattern?

Lines 458-530: Apart from the analysis of trends, could you explain more how to interpret the results of the STL analysis for example in terms of different importance of the three signal components?

Figure 6: The Figure has poor resolution. Also, there is no unit of measurement on the y-axis.

Line 579: Missing reference to a Figure.

Lines 660-666: This sentence is still not clear, and has to be revised.

Lines 702-703: Do you mean the improvements in the technology?

Lines 704-705: Not clear what you mean by “persistent changes”. Revise.

Code and data availability: still not in line with the policy of this journal.

Table S2 and text: the “nitrate-rich” and “sulfate-rich” factors should be “secondary nitrate” and “secondary sulfates”? also, the “fresh sea salt” and “aged sea salt” share much of the fingerprint, so there is no clear evidence of why they should be separated in two factors, at least from this table.

Figure S1 and text: is the temporal variation of biomass burning in agreement with your expectations? Does it increase in winter (it seems so) and with wildfires?

Figure S4: About the mineral dust factor (possibly better named “resuspension”, as mineral dust would be just the transport of dust from the desert), I would expect an increase in the summer season with less precipitation, and with Saharan dust transports. Is this the case?

Figure S1-S9: In most cases the BS and DISP bars (in the legend, but are actually lines?) cannot be seen. Also, apart from the temporal pattern, could you investigate the effect of meteorology at least in some of these factors?