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Interactive comment on “Disparities in particulate matter (PM_{10}) origins and oxidative potential at a city-scale (Grenoble, France) – Part I: Source apportionment at three neighbouring sites” *by* Lucille Joanna S. Borlaza et al.

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This is a solid paper showing source apportionment results at three different sites in Grenoble based on inorganic and organic tracers. It is well presented. Uncertainties and limitations of PMF analyses are comprehensively investigated, which is excellent. Interpretation is usually well justified.

I recommend publication after minor revision.

No major concern is identified. Detailed comments below:

Understood that why you did not present the composition data in detail. But it would still be useful to present the mass closure (e.g., as pie chart). I would prefer to see it in the main paper.

Abstract: Homogenous and heterogenous sources are not widely used terms; how these are defined?

Line 123: Please justify with more evidence why 1.8 OM/OC ratio is chosen, particularly for the particular location.

Section 2.2 / 2.3: Please describe the blank correction procedures briefly, and the levels in field blanks in SI?

Line 137-141: what is the recovery of trace elements in a reference material? Al concentration really low - is the recovery low?

Line 184: define OC* in the main text

Line 213: I do not think you mean “source profile”. It should be factor profile. Revise across the manuscript accordingly. Source profile refers to measured profile from source aerosols.

2.4.3: why started from 7 factors, e.g., not 5? Based on experience?

Line 243: rewrite – two “contribution” in the same sentence; high contribution of inorganic ions does not necessarily suggest long-range transport? Strong inversion, indicated later, could mean that the air is stagnant for some time in the region, making chemical conversion possible.

What is the altitude of the three sites? Similar ? This could have implications if the mixing layer height is low.

Figure 2: explain why sometimes there are large spikes (differences) for some of the observed species.

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Line 276: explain what caused the episode of phthalic acid

Figure 3: specify a correlation between what and what

Table 2: Aged sea salt should have sulfate or nitrate; it appears that there is an artificial split in the profile? Looking at the factor profile (line 149 in SI), you do not have contribution from nitrate. If the figure is presented as concentration in the left Y axis and contribution in the right Y axis, then it might be easier to see. OC is very high but it does appear in any of the factors as a tracer, which is odd. Look at SI (line 94), you do have contribution from OC

Table S2: Al is extremely low – Are you confident of this data? Could it be due to the very low extraction efficiency? Or may be there is no / little mineral dust ?

SI – Line 168: More in the winter suggesting road salt. But can you explain the spikes – sometimes they appear at all sites but sometimes not.

SI Figure S3.6 – Why the time series for CB is not consistent with those of the other two sites? It appears that the trends are opposite. Again, I would really like to see the concentration (in addition to the contribution) in the left figures. This factor seems to have a bit of everything with a high contribution from Se – does this suggest a strong coal combustion signature?

Figure S3.8 – Do the time series follow MSA concentrations? Can you explain the spikes that appear in some but not other sites? The large contribution to PM10 mass is puzzling. Perhaps you could go back to your original data to check for potential mistakes? And definitely should check for the mass closure.

Fig. S3.10- Factor profile are remarkably similar, which is good. Why Vif shows a rather different time series?

Figure S5.2 – If you remove the few outliers then the correlation might be very different. So perhaps you should check your data quality for those datapoints or find a potential reason why these are outliers? For example, meteorological factors?

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3.2.1: It would be useful to provide some more discussions on the origins of some of the factors such as sulfate rich factor, as you did for the other factors. Perhaps not for all but at least for some of the more tricky ones (e.g., sulfate rich)

Line 459-467: the source of Ca2+; it is often used as a tracer for construction dust but there may not be a lot of construction activities in the city. Are local soils rich in carbonate? And why the loading of Ca2+ in the primary traffic is high? Is it from the resuspended dust or is it from the primary engine emissions?

Line 499-301: some explanations are given here but this could be enhanced. Could meteorology play a role (if one is at a high altitude so mixing layer height plays a role)? Could there be local sources that are present at one site but not the others?

Line 505 – yes, this is why I suggested above to identify the reasons behind the outliers, and show the correlation with and without such outliers.

Line 507 – Ok, this is sensible but please can you analyse the meteorological data to support this hypothesis?

Line 509 – Can you combine the sulfate and nitrate factors and correlate them? This might help with the argument of the possible “inability” for PMF to separate?

Fig. 9 is interesting and there got to be some reasons behind this (see above suggestions)

Line 520 – 529 : the analysis here is very interesting; why dust at Vif appears to be from Spain but not the others is interesting. Can you explain this by the topography, including the altitude of the sampling sites?

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