

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-995

Anonymous Referee #2

Referee comment on "PM₁₀ variation, composition, and source analysis in Tuscany (Italy) following the COVID-19 lockdown restrictions" by Fabio Giardi et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-995-RC2>, 2022

Well written paper on comparisons between pre during and post COVID time frames at a range of sampling sites in Italy. Comprehensively covers the sampling and the analysis aspects. The data are sufficiently novel to warrant publication.

The general comments that I have are mainly related to:

Better clarification and discussion around which samples were PM₁₀ and which were PM_{2.5} in each section. I found this distinct often hard to unravel when certain sections were discussed and this is particularly important.

I know PM₁₀ contains PM_{2.5} but the discussion around the primary use of PM₁₀ in the PMF analysis is weak and not convincing. Many of the sources obtained are PM_{2.5} focused, like vehicles and secondary sulphate so why use PM₁₀? Needs more convincing discussion. Also key elements like Si and Al that drive soil which is a key component of PM₁₀ were not measured. The effect of not having these elements included is not adequately discussed

PMF is a powerful source apportionment tool but it only ever gives average source fingerprints across the data supplied, small changes in these fingerprints can produce significant changes in their contributions to the total PM₁₀ mass. What would the sources look like if only the PM_{2.5} masses were considered – after all the major changes occurred in the Traffic signal which should clearly be in the PM_{2.5} fraction?

Cl is often present in Traffic and Combustion fingerprints to associate it only with sea spray when Na was not measured needs more justification. Maybe 7 fingerprints not 6 in the PMF fit would tease this out!

I didn't see any meaningful discussion and quantitative data on the Q values for the PMF fits were they close to the expected theory values?

All the scales on many of the plots and figures are too small to read easily should be increased in size.

The conclusion alludes to the fact the number of samples in this study covering just a couple of months might be too small to draw major conclusions! Do the authors believe this?