

Interactive comment on “Exploiting multi-wavelength aerosol absorption coefficients in a multi-time source apportionment study to retrieve source-dependent absorption parameters” by Alice C. Forello et al.

Anonymous Referee #2

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This article presents a source apportionment analysis within the urban area of Milan, Italy. The originality of this study firstly lies in the use of data with different temporal resolutions as one single input data. A modified equation of the standard equation of the MultilinearEngine has been used, which has been scarcely used in the literature. The second original feature is the use of absorption data. The authors were therefore able to derive optical properties of the obtained factors.

Overall, the paper is well-written and is well-organized. I think it deserves publication in ACP, but several points need to be addressed before. I fully agree with reviewer #1 about

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the methods section. The authors need to be much more didactic on the way they handled uncertainties: - First, little information are provided regarding the calculation of uncertainties for each variable. Sometimes a range of values is provided, but we don't know which value was actually used with the Polissar equation. - Also, since absorption data are rarely used in PMF analyses, I would recommend to perform sensitivity tests on the uncertainty of 15% that was used, and evaluate the impact on the PMF results. - Then, the reader has no information about the balance of the Q in the input variables, yet being a critical issue in the multi-time algorithm. Have the authors adjusted the uncertainties so that the Q is approximately balanced in each group of variables ? - The authors state that scaled residuals are randomly distributed between -3 and 3. Are these residuals centered around 0, with a Gaussian shape ?

I am also a bit disappointed to see that discussions about optical properties are essentially focused on traffic and wood-burning, but little is said about absorption found in the nitrate-rich factor, the sulfate-rich factor (the presence of EC in the profile is not discussed) and the dust factor.

Finally, in order to strengthen the interpretation of the factors, I recommend to perform a trajectory analysis (eg Potential Source Contribution Function, or Concentration-Weighted Trajectory), especially for aged sea salt and dust. The approach proposed in the manuscript is a bit simplistic.

Specific comments: - p12 l325 : why road dust does not appear in the traffic factor ? - p16 l386 : in this paragraph, I would also mention PMF studies including "Delta-C" (Wang et al., 2012), as written in the introduction.

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