

Comments to Editor:

My understanding is that HPB has a rather extensive set of other chemical measurements in addition to the 24 NMHCs you analyze here. I would urge you to include some of those parameters in the PMF if at all possible. I am thinking now of NO_y, PAN, CO, Radon, and perhaps compounds like CH₃CN and acetone, if available. As it is, some are discussed only after the PMF, which seems to me to be much less objective and rigorous.

We included the following substances in the PMF together with the 24 NMHCs (only single substances added as well as combinations of different substances; see manuscript for details): NO, NO₂, SO₂, CO, NO_y, O₃, PAN, PM10, PM3, and black carbon. Not a whole lot of new information could be drawn out of those analyses. However, we included the relevant parts in the revised manuscript, in particular in section 3.2 Source apportionment. The results, when including other substances in the PMF actually were quite similar to the pure correlations of the PMF factors with the trace gas concentrations. That in our opinion is a good sign that the PMF results are quite robust.

Also, I agree with Reviewer 2 as you do in your response, that VOC aging should be explicitly included using the method of Yuan et al., 2012. The method of accounting for reactivity that you have chosen suffers from a lack of knowledge of the starting concentration, an approach using VOC ratios can get around that. As you do this, it would be good to update some of the references on emissions profiles, for example, aromatics in vehicle exhaust have changed in the past 10 years.

We tested the method of Yuan et al. (2012) for photochemical aging in detail as well as performed the tests for photochemical independence of the factors from the same paper. Please see answer to Reviewer #2 and the revised manuscript for details. We updated some references on emission profiles. Overall, our conclusion is that the Yuan method is not appropriate (too many small and disperse sources), however, the PMF yields very useful factor information enabling a characterization of the chemical regime at the station by means of various source category and aging impacts.

We also added a whole new section about seasonality and the usefulness for interpretation of the factors by the application of a box model and comparison of measured and calculated amplitudes according to the reviewers' comments.