

Review report on the revised version of

Chemical characterization of submicron regional background aerosols in the Western Mediterranean using an Aerosol Chemical Speciation Monitor

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The scientific quality of the revised version of the manuscript has improved after the incorporation of the comments/ suggestions of both the reviewers. Nevertheless, there are still some issues that did not get addressed adequately.

Primarily, some more detail is provided concerning the PMF analysis, but once again there is no specific mention of residuals, nor stability of the solution, not even at the supplementary material, apart from the statement that "This solution was chosen based on several tests with different number of factors following the strategy described by Crippa et al. (2014) and Canonaco et al. (2013)." Are factor profiles mixed? Is there a splitting behavior when moving to a higher number of factor solution? How much mass remains unexplained? Which are the correlations with external data mentioned, but not provided, in the revised version? In Figure 8 only the factor profiles and the diurnal variation is provided, what about the time series? Authors mention that that correlations with external tracers are studied but results are interpreted with caution and that is why not too much relevance to these correlation is given in the manuscript. A common feature, though, of most of the PMF analyses and source apportionment of the OA that can be found in the literature, are these correlations in order to interpret sources (e.g. BC with BBOA, sulphate or ammonium with OOA etc.). And several of these studies are conducted in remote and/or background environments, why Montseny should be that different?

Furthermore, authors argue that given the nature of the sampling site (regional background), with little influence from local sources and some influence from local atmospheric processes, several aerosol components show the same variation. This is, in fact, exhibited in Figures 5a and 9, which imply that there is chemistry and production of the different components near the site and conversion of e.g. organic components to OOA has not been completed. This, though, does not explain the very different diurnal variation of SV-OOA. If it is all background and most components have the same diurnal variation, why is the SV-OOA diurnal profile so different? In Crippa et al. (2014) the diurnal profile for SV-OOA in all sites, if not higher during nighttime, is pretty flat throughout the day. Please comment.

Technical corrections:

Figure 7 in the revised version still contains the nomenclature "Aged BBOA", please change to "OOAm" according to the text

Figure S9: Please correct "zoon" to "zoom" for the scatter plot.