

Interactive comment on “Variations in the chemical composition of the submicron aerosol and in the sources of the organic fraction at a regional background site of the Po Valley (Italy)” by M. Bressi et al.

Anonymous Referee #1

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The manuscript by Bressi et al. analyzed one-year submicron aerosol data that was collected at a regional background site in Po Valley using an ACSM. The performance of the ACSM measurements was fully evaluated, and the variations in chemical composition and diurnal cycles were characterized. Further, positive matrix factorization with ME-2 algorithm was used to resolve potential organic aerosol factors with different sources and processes. While SOA was important throughout the year, an enhanced role of biomass burning aerosols during cold seasons was also observed. Atmospheric aerosols in Po Valley have been widely characterized at both urban and rural sites and the results in this study were overall consistent with previous conclusions. Although

C1

there are no new scientific findings compared to previous studies, this manuscript is still worth for publication by providing a general overview in aerosol variations and sources on an annual basis in Po Valley.

My major comment is the discussions on seasonal differences. In the text, the figures only showed the averages on annual basis (some seasonal averages in supplementary). I suggest the authors move the important seasonal information into the main text. This is also one of the uniqueness of this study. For example, show the diurnal cycles of NR-PM1 species during four seasons in Figure 4. Please also show the diurnal cycles of mass concentrations of OA factors in Figure 2, sometimes, it is misleading if only the diurnal cycles of mass fractions are shown.

Fog events are frequent in Po Valley. I am surprised that the authors didn't discuss the fog impacts (scavenging and production) on aerosol variations, particularly in winter.

With one-year data, weekend effects might be explored for a better interpretation of sources.

Line 394, “and previous observations (Putaud et al., 2013)” is not one of the reasons. Line 449, typo, “C2H30+”.

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C2