

Interactive comment on “Sources and processes that control the submicron organic aerosol in an urban Mediterranean environment (Athens) using high temporal resolution chemical composition measurements” by Iasonas Stavroulas et al.

Anonymous Referee #5

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This paper aims to identify sources of submicron organic aerosols in Athens with a major interest on quantifying the contribution of biomass burning. Results are based on high temporal resolution chemical measurements performed by an ACSM. As stated by authors, this is the first study on submicron aerosol by using high temporal measurements during a relatively long period (1 yr plus 2 winter periods). However, it is a very descriptive work that does not provide new knowledge on atmospheric processes and sources in the eastern Mediterranean. The study is focused on the organics and mainly in the contribution of wood burning, as stated in the introduction section and as

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deduced from the extension of measurements during the two winter periods. Impact of wood burning in air quality is a growing concern in Athens in the last years. Thus, the authors (5 of 7) co-authored a paper currently on ACPD (<https://doi.org/10.5194/acp-2018-163>) focused on the impact of residential heating on fine particulate matter by applying PMF to the chemical characterization of filters (24 and 12h resolution). This study was performed in the same place and during part of the period covered by the present study. I have read the comments by the other reviewers and I strongly agree with the remarks from RC2, and also 3 and 4. I would like to add some minor comments and insist on some of the comments already mentioned by the other referees. My major concern is the use of constraints based on measurements performed in very different areas (HOA, COA and BBOA from north Europe) for the PMF of organics. Are these profiles usable in the study area? The profiles used should be more similar to the profile emissions in the area. Do the authors have some information about COA and BBOA profiles from the eastern Mediterranean area? Most statements about the origin of the SVOOA and SOA are hard to demonstrate based only in the interpretation of the diurnal variation.

Minor comments Experimental methods; Page 5. Was the ACSM calibrated on field? No information about filters sampling and analysis is provided. Please, indicate sampling period and frequency and the methods of filters treatment and analysis. Please, indicate the size range of SMPS TSI3034. Results and discussion In the supplementary, authors show the correlations between filters and ACSM for the whole period (SL1.1) and for the winter periods (SL1.2). Is there any reason for the different slopes determined for each period? Do you expect the presence of coarse nitrate in the 1-2.5 μm fraction? Did the OA/OC ratio keep constant along the sampling period? Did you compare EC vs BC? Is this ratio constant along the study period? Is any difference in winter with respect summer? Line 256. Contribution of nitrate in summer? Line 260. There is a BC peak in June not related to any other compound (figure 3). What is the cause of this maximum? Any information from the measurements by means of Aethalometer? Line 265 semi-volatile inorganics; and organics? Lines 290 293: Is

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nitrate primary emitted? Do you mean that nitrate is quickly formed from primary NO_x? Can be the relatively high levels of nitrate be related to the low stability of nitrate with temperature? It is risky to assign a source origin to nitrate only from the diurnal variation. Line 296: What do you mean with “normalizing the diurnals”? Line 363: Please, replace “2016 and 17” by “2016 and 2017” Line 477. Did you check the correlation with the BC fractions? Does the HOA factor correlated better with BC_{ff} than with BC_{wb}? Figure 8. Why COA factor increased with wind from the eastern sector? Line 480-483. During the cold period nitrate correlates with LV-OOA while in summer it correlated with SV-OOA. Could you explain the reasons of it? Summary and conclusions Line 535. Sulfate and ammonium concentrations are not lower in summer Line 571. What do you mean with “central heating”? Fuel-oil heating?

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