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Comment

Interactive comment on “Sources and atmospheric processing of organic aerosol in the Mediterranean: insights from aerosol mass spectrometer factor analysis” by L. Hildebrandt et al.

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This paper identifies 3 unique factors, the amine-OA and OB-OA are quite interesting, I have a few short comments, especially regarding the interpretation of the amine-OA, which may be valuable to the manuscript

(1) The amine-OA factor shows a characteristic m/z 58, most likely $C_3H_8N^+$, which is associated with trimethylamine, TMA (C_3H_9N). m/z 86 can be $C_5H_{12}N^+$ (can come from TEA and DEA salts). This can be verified from a number of ambient studies

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(many of them are from ATOFMS, see lists in our recent review: Ge et al., atmospheric Environment, 2011, 45, 3, 524-546). TMA is the most common and abundant amine in the atmosphere, with marine emissions as an important source. Although in this study, the authors found that amine-OA is not linked to sea salt, it is possible that it is a secondary OA factor. Based on thermodynamic equilibrium, it is possible that gas phase TMA (probably abundant in the sampling site near the ocean) could be transformed into particulate ammonium salt, and this transformation is favored by conditions of cold temperatures and high RH (see Ge et al., atmospheric Environment, 2011, 45, 3, 561-577). This is somehow consistent with the authors' finding that amine-OA peak during night and abundance of clouds.

(2) A recent study for TMA particles from ATOFMS by Rehbein et al (Environmental Science and Technology 45 (10), 2011, 4346-4352) also verified this assumption.

(3) From AMS, Sun et al. (Atmos. Chem. Phys., 11, 1581–1602, 2011) also identified a nitrogen-rich factor with a unique peak at m/z 58 from $C_3H_8N^+$ during the NYC campaign (near the ocean).

(4) The amine-OA factor is non-volatile. Can the authors provide the correlation of this amine-OA factor with SO_4 ? Sulfate is the major inorganic species in the aerosols (correct?), it is possible that TMA is associated with SO_4 . Although in (Ge et al., atmospheric Environment, 2011, 45, 3, 561-577), the formation of $TMASO_4$ is not predicted due to unavailable data, it is likely a non-volatile species similar to $(NH_4)_2SO_4$.

(5) Amines have been found to play an important role in new particle formation (more efficient than ammonia, there are a number of papers recently, for example about TMA, see Erupe et al., Atmospheric Chemistry and Physics 11 (10), 2011, 4767-4775). Is there any correlation of the amine-OA factor with nucleation mode particles?

(6) The OB-OA factor is not like the BBOA factor identified from other studies. Is it possible to correlate the OB-OA mass spectra with BBOA and HOA factors (since this OB-OA also has significant contributions from m/z 55 and 57) from other studies,

also with ones for the particles directly emitted from Olive tree branches burning (if available)? It maybe interesting to see the difference.

Xinlei

Best regards

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19639, 2011.

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