Source apportionment in suburban environment during summer

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The atmospheric load of anthropogenic aerosol species is determined by factors such as emission, aging, convective transport and deposition processes, the level of scientific understanding being recognized to be medium to low (IPPC, 2007).

This study aims to identify the sources of aerosols in a suburban area near Bucharest, Romania, during the EMEP summer campaign, 7th June to 18th July 2012. Continuous measurements of submicron non-refractory aerosol composition with 10 minute time resolution from a C-Tof–AMS (Drewnik et al., 2005) and meteorological data (temperature) were used to characterize the local suburban aerosol.

The Hysplit trajectory model (Draxler R.R., et al, 2012) suggested that the site area was influenced by air masses coming mostly from west and south of Europe, therefore Saharan dust, aerosols from vegetation fires but also urban polluted aerosols could be present over the measurements' location during this campaign. Locally the agriculture activities are the most important sources of organic aerosols, mainly biomass burning.

In order to identify the main sources of aerosols at our site location we used the ME-2 algorithm to deconvolve the measured AMS organic mass spectra as described by Canocaco et al. (2013) and Lanz et al. (2008). Measurements influenced by high humidity and m/z 29 and 30 peaks due to air fragmentation were excluded from the entire dataset. Two factors were constrained during ME-2 analysis: biomass burning organic aerosol (BBOA) and hydrocarbon-like organic aerosol (HOA), and two unconstrained factors were also found: low-volatility oxygenated organic aerosol (LV-OOA) and semi-volatile oxygenated organic aerosol (SV-OOA).

BBOA was present during the entire measurement period. The ratio of organic m/z 60 (a characteristic fragment of sugars such as levoglucosan) to the total organics (denoted *f60*) often exceeded 0.003, the background level found by Cubison et al. (2011). The *f60* values exceeded this threshold for almost 70% of the measurements. In Figure 1, we show *f44* versus *f60*, which suggests the presence of BBOA and low volatility oxygenated organic aerosols (LV-OOA) organic aerosols (Cubison et al., 2011). BBOA likely derives from a combination of local agricultural activities and long-range transport.

The second constrained factor, HOA, is related to traffic activity and may be influenced by the ring road around Bucharest situated approximately 1 km from the sample location.

The time series of SV-OOA, correlation with NO_3 and diurnal pattern (not shown) indicate more local origin. LV-OOA has a more regional character, without a diurnal pattern, being correlated with long range transport (DeCarlo et al., 2010).

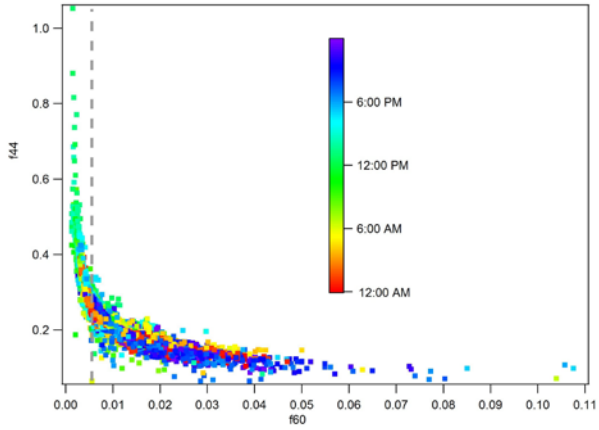

Figure 1 *f44* versus *f60* ratios for the entire campaign, 7th of June-18th of July

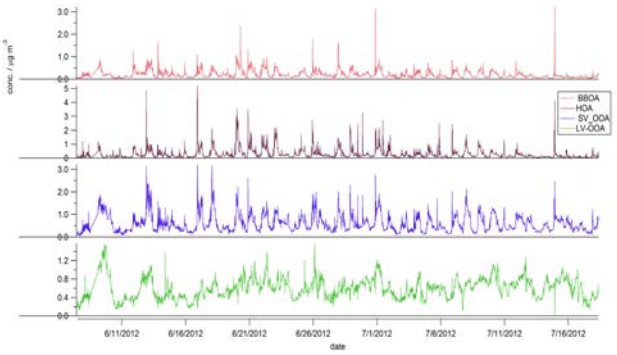

Figure 2 Time series of source apportioned organic components

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Canonaco et al.,(2013) Atmos. Chem. Phys, in prep.

Cubison, M. J., et al (2011) Atmos. Chem. Phys., 11, **12049–12064**

DeCarlo et al., (2010) Atmos. Chem. Phys.,10, 5**257-5280**

Draxler R.R., et al, (2012), HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website

Drewnick, F., S.S. et al., (2005) Aerosol Science and Technology, **39:637–658**,

Lanz, V.A., M.R. et al., (2008) Environmental Science & Technology, 42(1), **214-220**.