Winter Intensive Measurement Campaign at Magurele, Romania

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Introduction

Aerosols have an impact on human health and on the radiative budget of the Earth. For studying the carbonaceous aerosols, which represent up to 70% from total PM1 (Yttri *et al*., 2018), an intensive measurement period was conducted in the frame of EMEP/ACTRIS/COLOSSAL during the winter 2017–2018.

This paper shows the results obtained in Romania during the intensive campaign. The measuring site is located in southern Romania, close to the capital city, Bucharest and thus is influenced by urban and rural activities.

Methods

Characterisation of the aerosol features for the winter season was performed using collocated instruments: Aerosol Chemical Speciation Monitor (Q-ACSM), Aethalometer AE-33, Aerodynamic Particle Sizer 3321 (APS), optical particle sizer GRIMM EDM 180 (GRIMM-OPC) and filter measurements for deriving sugars and EC/OC concentration. Additional data for meteorological parameters (temperature, wind speed, wind direction, relative humidity, solar radiation) and gases concentration (NO, NO_2, NO_X, O_3, SO_2, CO) were also measured.

Conclusions

The particle sizer instruments highlighted the presence of submicronic particles (Figure 1). The average concentration of total PM_1 was 36 µg/m^3, representing 80% of the total PM_{10}. A good agreement between PM_1 derived from GRIMM-OPC and the PM_1 derived from Q-ACSM and black carbon was found (a slope of 0.93 and a R^2 of 0.88).

The measurement period was characterized by high loadings of organic aerosol, representing 55% of the total non-refractory PM_1, while the inorganic aerosols were divided into: nitrate 20%, sulphate 17%, ammonium 5% and chloride 3%. The collocated measurements highlighted the presence of local sources for residential heating and traffic in the northern part of Bucharest, close to the ring road of the city.

The black carbon concentration measured at the site was splitted into contribution from fossil fuel and wood burning using the absorption at 470 and 950 nm wavelengths and specific Ångström exponents (for fossil fuel 1.02 and 1.88 for wood burning).

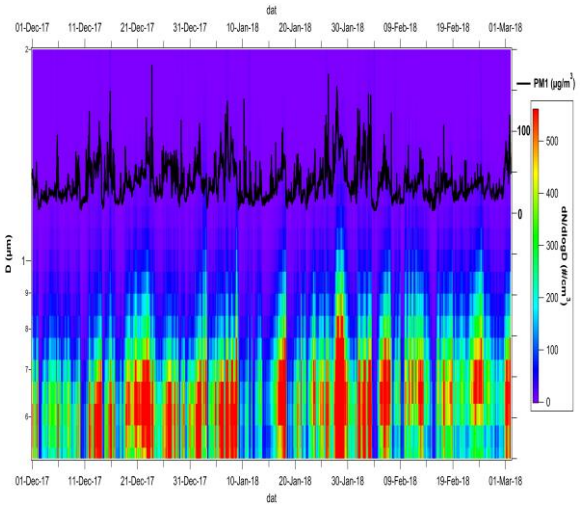

Figure 1. Aerosol size distribution (from APS) and PM1 (from GRIMM- OPC, black line) mass concentration.

The organic concentration deconvolution showed the presence of four different factors: hydrocarbon-like organic aerosol - HOA, oxygenated organic aerosol - OOA and two types of biomass burning organic aerosol: one fresh with a higher *m/z* 43 and one more oxygenated characterized by a higher *m/z* 44. The resulting factors were validated with external tracers: NO_x, black carbon related to fossil fuel and from wood burning.

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