Comparison of Winter Biomass Burning Source Contribution at National Atmospheric Observatory Košetice Based on AMS and Aethalometer Data.

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COMPARISON OF WINTER BIOMASS BURNING SOURCE CONTRIBUTION AT NATIONAL ATMOSPHERIC OBSERVATORY KOŠETICE BASED ON AMS AND AETHALOMETER DATA

Jaroslav SCHWARZ[1], Petr VODIČKA[1], Naděžda ZÍKOVÁ[1], Saliou MBENGUE[2], Norbert SERFOZO[2], Petra POKORNÁ[1], Otakar MAKEŠ[1], Vladimír ŽDÍMAL[1]

[1] Institute of Chemical Process Fundamentals, CAS, Prague, Czech Republic, schwarz@icpf.cas.cz
[2] CzechGlobe, CAS, Brno, Czech Republic

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INTRODUCTION

Although atmospheric aerosol concentrations exhibit decreasing trend in last decades, the contribution of aerosol emitted by biomass combustion is opposite due to increasing wood combustion used for residential heating (Pokorná et al. 2018). Previous works (Schwarz et. al. 2016) determined that the share of aerosol of biomass burning origin was up to 50 % in winter. In this work, the data from aerosol mass spectrometer (AMS) and Positive Matrix Factorization (PMF) are used to elucidate biomass combustion aerosol impact at National Atmospheric Observatory Košetice (NAOK) and the results are compared with simple aethalometer model approach.

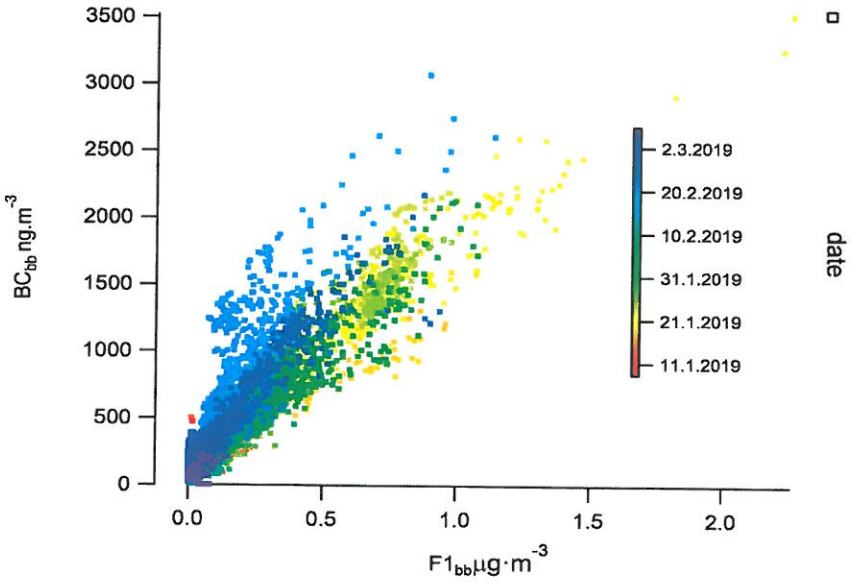

Fig. 1: Scatter plot of mass concentrations of biomass burning factor (x-axis) and black carbon from biomass burning of 10 min time resolution data (y-axis).

EXPERIMENTAL SETUP

The non-refractive PM1 (NR-PM1) aerosol was sampled and analyzed using a Compact Time of Fight Aerosol Mass Spectrometer (C-ToF-AMS, Aerodyne research,

USA) at NAOK from November 2018 till June 2019 in parallel with PM10 sampled by Aethalometer AE33 (Maggee Scientific, USA) both with 1 min integration time, averaged to 10 min. This work concentrates on winter period from 08/01 - 06/03 2019.

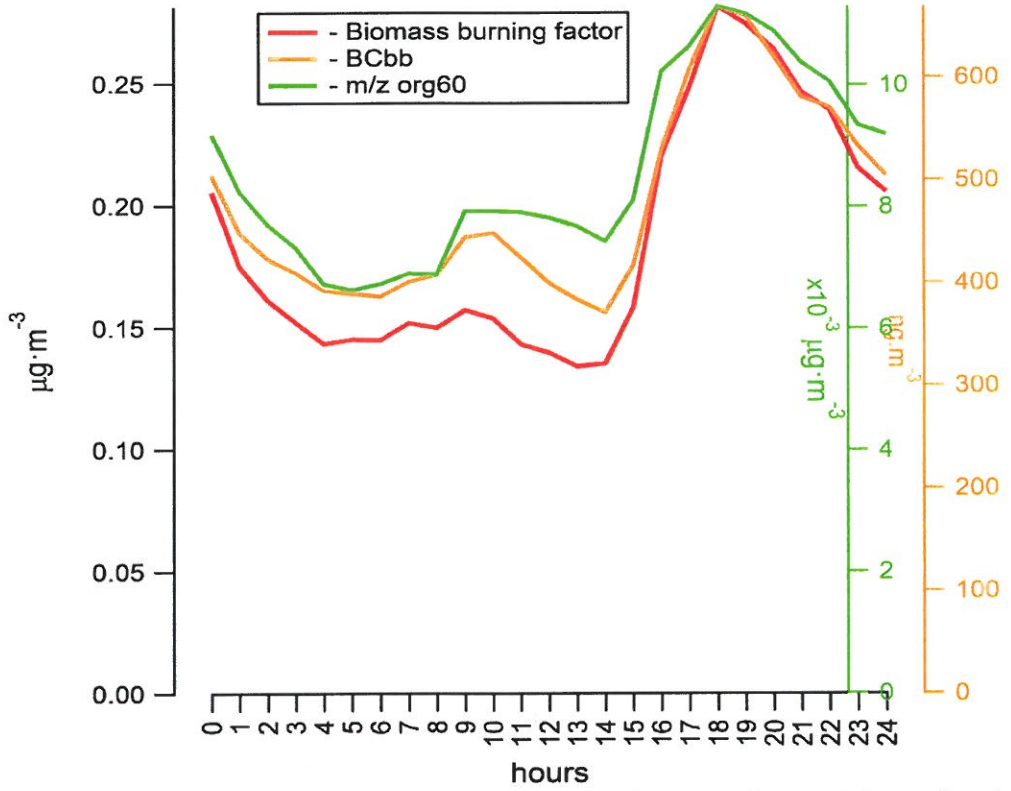

Fig. 2: Comparison of diurnal cycles for the biomass burning factor, BC_{bb} and m/z org60.

RESULTS AND CONCLUSIONS

Fig. 1 shows scatter plot of BC_{bb} and factor 1 from PMF solution identified as biomass burning factor based on organic m/z 60 content. However, mass concentration of BC_{bb} is much higher even if we take into account AMS data uncorrected for collection efficiency. Diurnal cycles of biomass burning factor, BC_{bb} and organic m/z 60 shown in Fig. 2 suggest that factor 1 does not contain aerosol transported to NAOK from longer distances as it has the highest midday decrease in comparison with the other quantities.

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REFERENCES

Pokorná, P., Schwarz, J., Krejčí, R., Swietlicki, E., Havránek, V., Ždímal, V., *Environ. Poll.* 241, 841-851, (2018).

Schwarz, J., Cusack, M., Karban, J., Chalupníčková, E., Havránek, V., Smolík, J., Ždímal, V., *Atmos. Res* 176, 108-120, (2016).