Search for Links between Organic Aerosols Measured by Aerosol Mass Spectrometer and EC/OC Analyzer

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SEARCH FOR LINKS BETWEEN ORGANIC AEROSOLS MEASURED BY AEROSOL MASS SPECTROMETER AND EC/OC ANALYZER

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INTRODUCTION

Carbonaceous aerosols form a major part of particulate matter suspended in the atmosphere. The organic part of aerosol represents a diverse group of substances that can be analyzed in different ways. In this work, the possible linkages between organic fractions measured by Compact Time-of-Flight Aerosol Mass Spectrometer (AMS; from Aerodyne) and a semi-online EC/OC analyzer (from Sunset Laboratories) were search. Each of these instruments provides a different kind of information. Organic fractions from EC/OC analyzer provide knowledges about a diferent volatility of organic carbon (OC) while AMS provide informations about a chemical composition of characteristic mass fragments. Thus, the main objective of this work was to determine whether the organic fractions from EC/OC analyzer can indirectly provide also information on the chemical composition or somehow more characterize type of aerosol.

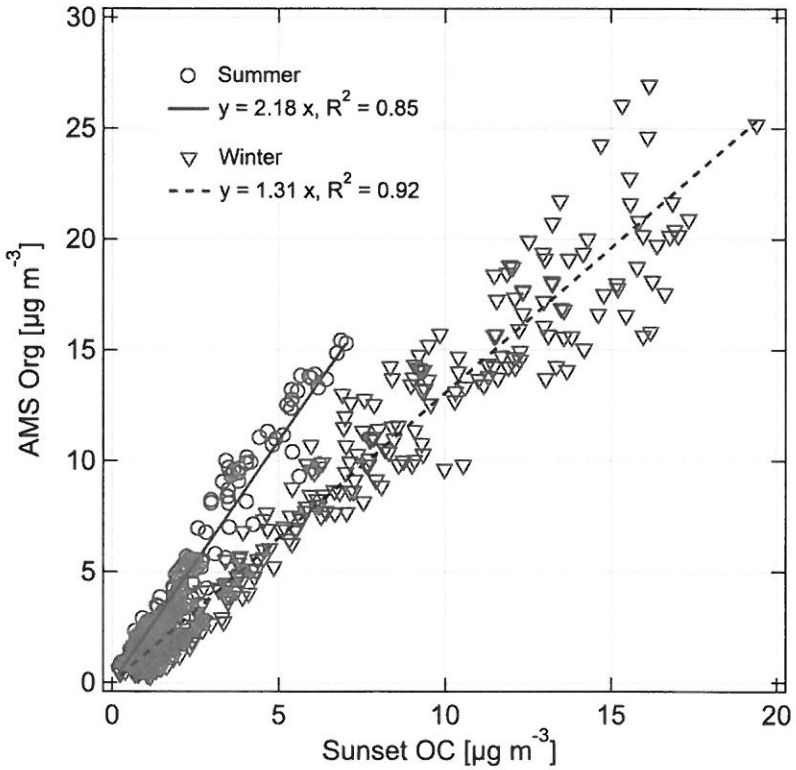

Fig. 1: Comparison of organic mass concentration (Org) measured by the AMS and organic carbon (OC) measured by EC/OC analyzer during winter and summer.

EXPERIMENTAL SETUP

We compared two sets of data from urban backgroun site - the first measured in summer (22.-26.6. a 13.-31.7.2012) and the second in winter (8.1.-4.2.2013).

In addition to elemental and organic carbon (EC and OC), measured in PM_1 fraction, the EC/OC analyzer provided also concentrations of OC fractions in the following temperature ranges – OC1: <200°C, OC2: 200-300°C, OC3: 300-450°C and OC4: 450-650°C. Pyrolytic carbon (PC=OC-OC1-OC2-OC-OC4) was also quantify and OC data were corrected on a dynamic blank.

Total organic mass (Org) and following organic fragments were taken from AMS measurements. The peak *m/z* 44 represent higly oxidized CO_2^+ fragment which can be atributed to organic acids. The peak *m/z* 43 consists from fragments $C_2H_3O^+$ and $C_3H_7^+$. The *m/z* 57 is comprised of two fragments ($C_3H_5O^+$ and $C_4H_9^+$) which are considered as tracers for primary organic emissions of fossil fuel combustion. Finally, the *m/z* 60 is generaly linked to the presence of biomass burning organic aerosol. Several corrections were applied on the AMS data - baseline setting, *m/z* and airbeam corrections, recalculations based on right ionization and collection efficiency.

Furthermore, meteorology, trace gases concentrations and resulting factors from ME-2 (multilinear engine) analyses on organic aerosol data from AMS were taken to this comparison.

RESULTS AND CONCLUSIONS

Figure 1 shows different slope between Org and OC in winter and summer which points to the probable changes on the oxidation states of organic aerosols during seasons (e.g. Chan et al., 2010). However, contrary to other works (e.g. Poulain et al., 2011), analysis of diurnal variations of Org/OC ratios did not show any significant daily pattern.

Other possible links between all the measured data were compared by using of correlation matrices. Details from all these analyses will be presented during the lecture.

ACKNOWLEDGEMENT

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