P2-1 Studies of carbonaceous particles at a traffic site - Moscavide/Lisbon, Portugal

Joana Coutinho[1], Nuno Canha[1], Marina Almeida-Silva[1], Catarina Galinha[1], Joana Lage[1], Tiago Faria[1], Vânia Martins[1], Célia Alves[2], Casimiro Pio[2], Teresa Nunes[2], Martin Rigler[3], Griša Mocnik[4], Marta Almeida[1]

[1]*C2TN, Instituto Superior Técnico, Bobadela, Portugal*
[2]*CESAM - Centre for Environmental and Marine Studies, Aveiro, Portugal*
[3]*Aerosol d.o.o., Ljubljana, Slovenia*
[4]*Jozef Stefan Institute, Ljubljana, Slovenia*

Particulate matter (PM) is a complex mixture of extremely small particles and liquid droplets emitted by different sources and produced in the atmosphere. It is very spatially and temporally heterogeneous and many sources contribute to PM and their gaseous precursors. One of the most important fractions is carbonaceous matter, which includes a refractive primary component - black carbon (BC).

BC is emitted during the incomplete combustion of fossil fuels, biofuels, and biomass burning and absorbs at all wavelengths of solar radiation. Together with methane and tropospheric ozone, BC is one of the most important contributor to current global warming after carbon dioxide. BC and co-pollutants are currently considered a major environmental cause of respiratory and cardiovascular diseases, with a global estimation of more than 7 million premature deaths annually from exposure to indoor and outdoor polluted air. Thus, it is of main importance to determine the chemical composition of submicron aerosol at high time resolution, providing the necessary information for accurate source apportionment.

With the purpose of characterising ambient aerosols and their time evolution and to assess the contribution of the main emission sources and processes leading to aerosol formation in the atmosphere a campaign was conducted in the urban centre of Moscavide (North of Lisbon, Portugal). A traffic air quality monitoring station was located close to one-way street with a total length of 1.2 km. Particulate matter was sampled and on-line BC measurements (Aethalometer AE33) and total carbon (TC, measured by TCA08) were performed simultaneously. The sampled filters were analysed by gravimetry, by XRF, for the determination of element concentrations, and by thermo-optical analysis, for the measurement of organic and elemental carbon.

We present highly time resolved measurements, perform source apportionment and investigate local and regional pollution events. Separation of contributions to BC from different combustion sources is based on the dependence of absorption on the wavelength, while the measurement of TC allows the determination of equivalent OC, that is the difference between TC and EC (inferred from BC), at high time resolution. The combination of the data generated by the on-line equipments was combined with data from the chemical analysis of filters (OC/EC and elements), obtaining for the first time the parameters for the thermal protocol applied in the University of Aveiro. Additionally, data from chemical characterisation of particles is used to support the source apportionment.

Acknowledgements

The authors wish to thank Life Program - Life Index Air project, Interreg Med – REMEDIO project, Cost Action - CA16109 COLOSSAL.