



Multi-wavelength characterization of carbonaceous aerosol

Dario Massabò (1), Lorenzo Caponi (1), Maria Chiara Bove (1), Andrea Piazzalunga (2), Gianluigi Valli (3), Roberta Vecchi (3), and Paolo Prati (1)

(1) University of Genoa, Department of Physics and INFN, Genoa, Italy, (2) University of Milano Bicocca Department of Environmental Science, Milan, Italy, (3) University of Milan, Department of Physics and INFN, Milan, Italy

Carbonaceous aerosol is a major component of the urban PM. It mainly consists of organic carbon (OC) and elemental carbon (EC) although a minor fraction of carbonate carbon could be also present. Elemental carbon is mainly found in the finer PM fractions (PM_{2.5} and PM₁) and it is strongly light absorbing. When determined by optical methods, it is usually called black carbon (BC). The two quantities, EC and BC, even if both related to the refractory components of carbonaceous aerosols, do not exactly define the same PM component (Bond and Bergstrom, 2006; and references therein). Moreover, another fraction of light-absorbing carbon exists which is not black and it is generally called brown carbon (Andreae and Gelencsér, 2006).

We introduce a simple, fully automatic, multi-wavelength and non-destructive optical system, actually a Multi-Wavelength Absorbance Analyzer, MWAA, to measure off-line the light absorption in Particulate Matter (PM) collected on filters and hence to derive the black and brown carbon content in the PM. This gives the opportunity to measure in the same sample the concentration of total PM by gravimetric analysis, black and brown carbon, metals by, for instance, X Ray Fluorescence, and finally ions by Ion Chromatography. Up to 16 samples can be analyzed in sequence and in an automatic and controlled way within a few hours. The filter absorbance measured by MWAA was successfully validated both against a MAAP, Multi Angle Absorption Photometer (Petzold and Schönlinner, 2004), and the polar photometer of the University of Milan.

The measurement of sample absorbance at three wavelengths gives the possibility to apportion different sources of carbonaceous PM, for instance fossil fuels and wood combustion. This can be done following the so called "aethalometer method" (Sandradewi et al., 2008;) but with some significant upgrades that will be discussed together the results of field campaigns in rural and urban sites.

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