

1–4

EC assessment on real samples by Thermal Optical Transmittance method with and without WSOC removal and using different protocols

A. Piazzalunga¹, V. Bernardoni², P. Fermo³, G. Valli², R. Vecchi²

¹*Department of Environmental and Territorial Sciences, Università degli Studi di Milano-Bicocca, Milan, Italy*

²*Department of Physics, Università degli Studi di Milano e INFN- Milano, Milan, Italy*

³*Department of Inorganic, Metallorganic and Analytical Chemistry, Università degli Studi di Milano, Milan, Italy*

Email: andrea.piazzalunga@unimib.it

At the state of the art, no reference method for EC quantification exists as the definition of this fraction is still method-dependent. As regards thermal measurements, different choices in heating ramp and combustion atmosphere affect the results. Moreover, the pyrolysis of the organic carbon component (OC) to form pyrolysed EC during the heating process, enhanced by the presence of water-soluble organic compounds (WSOC) in the sample and by inert atmosphere, can further complicate EC identification.

The aim of this work was to intercompare different protocols used in thermal optical measurements (Thermal-Optical Transmittance method by Sunset instrument); the intercomparison was carried out on real samples untreated and after WSOC removal. The thermal protocols tested were NIOSH (Birch & Cary, 1996), EUSAAR_2 (Cavalli et al., 2010), and IMPROVE (Chow et al., 1993).

Parallel aerosol samplings on quartz fibre filters were carried out in Milan (Italy) during January-February 2010 and June 2010 for a total of 41 samplings. One series was analysed for carbon content without any pre-treatment (UT, untreated) and the other one was analysed after Water Soluble Compounds (WSC) removal (WW, water washed).

Results of the intercomparison will be discussed highlighting the role of carbon components evolving at high temperature in the He-atmosphere (He-4) in the EC quantification and the better agreement on EC values obtained considering this component. Moreover, results on EC_{WW} and EC_{UT} measured by different protocols will be discussed in detail for wintertime and summertime samples.

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