

ORGANIC AND ELEMENTAL CARBON PARTICULATE CONTINUOUS FIELD MEASUREMENT IN ATHENS URBAN AREA

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EXTENDED ABSTRACT

Continuous field measurements of carbonaceous particles in PM₁₀ were performed in a trafficked urban area of the city of Athens, for a period of three months (January to March 2003). Organic (OC) and Elemental carbon (EC) were measured on an hourly basis using the Series 5400 Ambient Carbon Particulate Monitor (R&P), in order to investigate the characteristics of carbonaceous species and their possible sources. The daily average values of OC, EC, TC were $5.7 \pm 2.8 \mu\text{g}/\text{m}^3$, $1.8 \pm 0.6 \mu\text{g}/\text{m}^3$ and $7.5 \pm 3.5 \mu\text{g}/\text{m}^3$ respectively, while the average OC/TC ratio was 0.77 ± 0.04 which indicates that the carbonaceous particles main source is transportation. However, the above data suggest that Athens cannot be included among the heavily polluted cities.

The high correlation between mean OC and EC concentrations ($R^2 = 0.89$) indicates the dominance of common sources for these carbonaceous constituents. Considering the strong anti-correlation ($r = -0.6$, -0.58) between OC, EC and mean wind speed, the predominance of local sources is expected. The study of EC mean diurnal variation revealed the principal contribution of transportation to measured levels. Interesting comments can be drawn from the comparison of hourly EC concentration with traffic data (number of vehicles per hour).

The study of OC/EC ratio diurnal variation showed a photochemical activity even during cold period, enhancing the formation of secondary organic compounds. Particularly, the OC, EC, and TC concentration and OC/EC ratio were elevated during days with high temperature, intense solar radiation and low wind speed, indicating that secondary organic aerosol formation may be important in these cases. The strong correlation of OC and EC with NO_x concentration ($r = 0.82$, $r = 0.70$) indicates that primary OC and EC emissions have common sources with secondary organic aerosol precursors.

Key words: Carbonaceous Aerosol; Elemental Carbon; Organic Carbon; Atmospheric Pollution in Athens.