



Long-term measurements of aerosol optical parameters in Athens, Greece

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Aerosol chemical composition was studied in conjunction with its optical properties in the area of Athens Greece. For this purpose, sampling of fine aerosol fraction (PM_{2.5}) took place on a daily basis from August 2010 to April 2013 at an urban background location. The samples are subsequently analyzed for their content in organic (OC) and elemental carbon (EC), major ions and trace metals, resulting in the exercise of chemical mass closure. In parallel, the optical properties of aerosols are recorded using a nephelometer and a particle soot absorption photometer (PSAP), leading to the calculation of scattering (σ_{scat}) and absorption (σ_{abs}) coefficients, respectively; while single scattering albedo (SSA) and mass scattering and absorption efficiencies are thereafter calculated. Daily σ_{scat} values provide an average of $30.1 \pm 3.9 \text{ m}^{-1}$ while, the average of σ_{abs} is $5.2 \pm 1.4 \text{ m}^{-1}$. The seasonal cycle of σ_{scat} presents maximum during summer and in November, due to long-range transport of aerosol from continental Europe and dust transfer from Africa, respectively. The estimated mass absorption efficiency of EC is estimated to be $8.3 \pm 0.2 \text{ m}^2 \text{ g}^{-1}$ for the whole studied period, while the corresponding estimated mass scattering efficiency of PM_{2.5} is $1.7 \pm 0.1 \text{ m}^2 \text{ g}^{-1}$ and does not affected by the presence of dust. The average SSA equals to 0.87 ± 0.11 for the three-year period. On a seasonal basis, SSA presents maximum values during summer that is consistent with the reduction of EC - the main absorbing specie. Finally, the reconstruction of scattering coefficients was performed taking into consideration the measured chemistry of fine aerosol.