



Aerosol optical properties in urban Guangzhou, China

O. Schmid (1), H. Yang (2), D. Chand (1), J. Z. Yu (2), Y. Zhang (3), L. Zeng (3), M. O. Andreae (1)

(1) Max Planck Institute for Chemistry, Mainz, Germany, (2) Hong Kong University of Science and Technology, Hong Kong, China, (3) Peking University, Beijing, China
(oschmid@mpch-mainz.mpg.de / Fax +49 6131 305 487)

During the intensive period of the Pearl River Delta (PRD) measurement campaign (4 Oct - 5 Nov 2004), we performed in-situ measurements of aerosol optical properties ($PM_{2.5}$) in urban Guangzhou (23.08N, 113.16E, altitude 8m asl; ~150 km northwest of Hong Kong). A photoacoustic spectrometer (532 nm) and two integrating nephelometers (545 nm) were used to determine aerosol light absorption (dry, RH < 40 %) and scattering coefficients (dry and ambient), respectively. In addition, twelve-hour averages of elemental (EC) and organic carbon (OC) aerosol mass concentration were determined by evolved gas analysis.

The average scattering and absorption coefficients for dry aerosol were 402 and 88 Mm^{-1} . During some episodes, extremely high values of aerosol absorption were reached (up to 450 Mm^{-1}). Consistent with the urban pollution sources and the exceptionally dry weather conditions, the average single scattering albedo (SSA) at ambient conditions was about 0.86, indicating strongly absorbing aerosol. The average total, OC and EC mass concentrations ($PM_{2.5}$) were 103, 22.3 and 7.1 $\mu g m^{-3}$, respectively, indicating an average OC/EC ratio of about 3. Combined with the observed mass specific absorption coefficients of 7.7 and 0.76 $m^2 g^{-1}$, respectively, we estimate that OC contributed about one third to absorption at about 540 nm. The observed diurnal trends of the optical properties are consistent with particle growth by condensation during day, enhanced traffic activity in the morning and evening hours, and the build-up of a shallow nocturnal boundary layer during night.