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Retrieval of aerosol complex refractive index from a synergy between lidar, sunphotometer and in situ measurements during LISAIR experiment

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Abstract. Particulate pollutant exchanges between the streets and the Planetary Boundary Layer (PBL), and their daily evolution linked to human activity were studied in the framework of the Lidar pour la Surveillance de l'AIR (LISAIR) experiment. This program lasted from 10 to 30 May 2005. A synergetic approach combining dedicated active (lidar) and passive (sunphotometer) remote sensors as well as ground based in situ instrumentation (nephelometer, aethalometer and particle sizers) was used to investigate urban aerosol optical properties within Paris. Aerosol complex refractive indices were assessed to be $1.56-0.034i$ at 355 nm and $1.59-0.040i$ at 532 nm, thus leading to single-scattering albedo values between 0.80 and 0.88. These retrievals are consistent with soot components in the aerosol arising from traffic exhausts indicating that these pollutants have a radiative impact on climate. We also discussed the influence of relative humidity on aerosol properties. A good agreement was found between vertical extinction profile derived from lidar backscattering signal and retrieved from the coupling between radiosounding and ground in situ measurements.

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