



Discrimination of aerosol species by correlated lidar and sunphotometer measurements in the Paris megacity suburban area

J. Totems (1), P. Royer (2), P. Chazette (1), M. Haeffelin (3), and C. Pietras (4)

(1) Laboratoire des Sciences du Climat et de l'Environnement, Laboratoire mixte CEA-CNRS-UVSQ, CEA Saclay, 91191 Gif-sur-Yvette Cedex, France (julien.totems@lscce.ipsl.fr), (2) LEOSPHERE, 76 rue de Monceau, 75008 Paris, France, (3) Institut Pierre-Simon Laplace - Ecole Polytechnique, 91128 Palaiseau Cedex, France, (4) Laboratoire de Météorologie Dynamique - Ecole Polytechnique, 91128 Palaiseau Cedex, France

This unprecedented study of daytime measurements performed over 3 years (2007-2010) with a robust commercial lidar (ALS 450, www.leosphere.com) installed ~ 20 km south of Paris (instrumented site of Palaiseau - SIRTa) and coupled with a sunphotometer, shows that differing optical properties allow the discrimination of several families in the observed aerosol content. While the lidar performed resolved measurements in the atmospheric column at 355 nm wavelength every 5 minutes with a vertical resolution of 15 m, the sunphotometer, which is part of the AERONET network, provided the spectral atmospheric transmittance between 340 and 1020 nm. Correlating the lidar and sunphotometer measurements opens interesting prospects for the detection of the main pollution events around the megacity of Paris. The Lidar Ratio (LR), the depolarization ratio (ρ) and the Angström coefficient (A) characterize specific aerosol optical properties and may sign their origins. They are retrieved from the instruments on clear days, as an average in the tropospheric column over a few minutes. Scatter plots along these parameters show that Parisian pollutants dominate the scene, with familiar properties corresponding to previous findings (LR ~ 70 sr $^{-1}$, A ~ 1). In some meteorological conditions, aerosol pollutants are observed which present different optical properties. We discuss these results in the light of known events in the survey time-line and conclude on the capabilities for identification of aged aerosols trapped within long range transport processes.