Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06512, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06512
EGU General Assembly 2008

Light extinction during the fog life cycle: a result from the ParisFog experiment

T. Elias (1), M. Haeffelin (1), P. Drobinski (1), L. Gomes (2), J. Rangognio (2), T. Bergot (2), P. Chazette (3), J.-C. Raut (3)

(1) LMD / IPSL, Ecole Polytechnique, 91128 Palaiseau cedex, France

(2) CNRM / Météo-France, 41 Av Coriolis, 31057 Toulouse cedex, France

(3) LSCE / IPSL, Orme des Merisiers Bât. 701, 91191 Gif-sur-Yvette cedex, France

One objective of the ParisFog field experiment is to study the influence of pollution aerosols on light extinction during fog events. Collocated measurements have been performed at the SIRTA Observatory (20 km South Paris), documenting microphysical and optical properties of the atmospheric particles (Aitken aerosols, accumulation mode dry and wet aerosols, and fog droplets), as well as the radiative budget in the surface atmospheric layer (from surface to 30 m above ground level). In the 18-19 February 2007 night, a dense fog (horizontal visibility de creases down 70 m) sets down for 8 hours, due to radiative cooling. This event is chosen as the case study of the relationship between particles and light extinction. Two complementary optical particle counters allow sampling the size domain of all atmospheric particles, from 0.01 μm to 40 μm diameter. Two visibilimeters provide the extinction properties of ambient particles. Mie theory allows studying the relationship between measured size distribution and measured extinction property in regards to the particle size.

Hydratation of pollution aerosols generates a slightly brownish haze, which precedes the fog outbreak. Visibility is high during the day, reaching 30 000 m. A change in the advection pattern at beginning of the night brings pollution aerosols on the site, reducing the visibility. These aerosols take up water while relative humidity increases from 80% to more than 90%, reducing visibility down to 300 m. Wet aerosols are not larger than 2 μm diameter, consequently the spectral dependence of extinction

is not neutral, and the Mie-computed Ångström exponent is around 1, indicating a brownish color. When relative humidity reaches 100%, the aerosols start to be activated and droplets larger than 2 μm diameter appear. Visibility reduces down to 70 m and Ångström exponent reduces to around 0, the fog is then white. We will study the succession of events on other fog events documented during the field campaign: the brownish haze always precedes the fog outbreak ? Transport of pollution aerosols always occurs before an event of reduced visibility ?