



Characterization of winter and summer aerosol pollution events in France using ground based and satellite data

M. Kacenelenbogen (1), J.-F. Leon (1), I. Chiapello (1)

(1) Laboratoire d'Optique Atmosphérique, CNRS-Université Lille1, Villeneuve d'Ascq, France (meloe@loa.univ-lille1.fr)

We present the analysis of aerosol pollution events during the year 2003 over Lille (51.61°N, 3.14°E, North of France) using both ground-based and satellite measurements. We have used two types of ground measurements: particulate matter PM_{2.5} from the French Air quality Agency (ADEME) and aerosol optical parameters derived from the AERONET network. POLDER (Polarization and Directionality of Earth's Reflectance) and MODIS (MODerate Imaging Spectroradiometer) sensors have been used to monitor the aerosol optical thickness from space. The case study is focused on peak events recorded during February and August 2003. During the two pollution events the PM_{2.5} values have reached 60 $\mu\text{g}/\text{m}^3$ in winter and 40 $\mu\text{g}/\text{m}^3$ in summer respectively. Aerosol plumes have been clearly identified over Northwestern Europe with corresponding aerosol optical thickness up to 0.8 in summer and 0.4 (470 nm) in winter as derived from MODIS/AQUA. The increase in the AOT has also been recorded by the Sun photometer located in Lille. The aerosol size distribution and refractive index derived from the Sun photometer in winter and summer are analyzed in order to determine if both pollution events are associated with the same type of aerosol. The relationship between Sun photometer AOT and PM_{2.5} highlights a good correlation for both winter ($r=0.80$) and summer ($r=0.85$). However, the slope of the regression is increased by a factor of ~ 3 in winter compared to summer, suggesting an impact of the vertical distribution of aerosols on the relation between mass concentration and optical thickness. Since the POLDER/ADEOS-2 has acquired data from April to October 2003, only the summer pollution event can be studied with this instrument. Nonetheless the comparison between POLDER aerosol retrieval and PM_{2.5} for August 2003 exhibits a significant correlation. The method will be applied to the whole

POLDER period and over France. The correlation between PM_{2.5} measurements and MODIS as well as the difference between MODIS and POLDER observations in terms of cloud mask and aerosol optical thickness retrievals will also be discussed.