



Radiative and Optical Characteristics of London Fire Plume as Observed from Space

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The case of London fire plume of December 11, 2005 has been a typical case of environmental accident, giving the opportunity to check the capacities of satellite observation and retrieval procedures. Normally the Bremen Aerosol Retrieval (BAER) (von Hoyningen-Huene et al., 2003) gives for the aerosol optical thickness quite comparable values with ground-based observations. This approach has been used also for MERIS L1 data containing the soot cloud originating due to this accident. The aerosol optical thickness (AOT) of 0.17-0.20 at the wavelength 412 nm has been retrieved for the area surrounding the fire plume. Similar results for AOT were reported by AERONET ground based measurements performed in the northern France at the wavelength 440nm (Dunkerque(0.2058), Lille(0.1321), and Fontainebleau(0.1665)). Unfortunately AERONET measurements are not available in UK.

Due to the strong absorption in the case of the London fire plume, very low values for the apparent aerosol optical thickness have been obtained, which have less than 50% of the values, obtained in the surrounding region. In the case of the plume, the single scattering albedo required for the look-up-tables used has been outside of the available range. The retrieved apparent aerosol optical thickness of this case is due to the scattering fraction of the optical thickness only. Also we found strong variations of Rayleigh-corrected top-of-atmosphere reflectance within the plume region with highest densities far from the plume origin. This is due to the propagation of the central plume from the explosion eastwards between time of explosion and the satellite overpass.

Investigations for the consideration of an appropriate single scattering albedo for the plume have been undertaken. Pure soot aerosol mixtures, based on OPAC models have

been assumed getting estimates for the single scattering albedo to apply. A correction of the apparent aerosol to that conditions in the surrounding let us to conclude that the single scattering albedo is less than 0.35. Using pure soot aerosol models the estimation of single scattering albedo is 0.25.

This plume of the fire accident near London showed, that this case has not been covered by standard assumption on aerosols used in retrieval schemes for space-borne observations. Therefore, special procedures for retrieval of aerosol parameters must be developed. One of them based on the model of a thick soot cloud is discussed in this paper.