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ALTITUDE DIFFERENTIATED AEROSOL EXTINCTION OVER TENERIFE (NORTH ATLANTIC OCEAN) DURING ACE-2 BY MEANS OF GROUND AND AIRBORNE PHOTOMETRY AND LIDAR MEASUREMENTS.

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Retrievals of spectral aerosol optical depths (τ_a) by means of sun photometers have been undertaken in Tenerife (28°16' N, 16°36' W) during ACE-2 (June–July 1997). Five ground-based sites were located at four different altitudes in the marine boundary layer and in the free troposphere, from 0 to 3570 m asl. All sites were equipped with CIMEL type sun/sky photometers [CE-318, CIMEL Electronique, Paris, France]. Additional radiometers were located at two sites, one at sea level and one at 3570 m asl. These were a prototype of the University of La Laguna in Tenerife [Automatic Sunphotometer OL-752 (ASOL-752)], and a Multi Filter Rotating Shadowband Radiometer [MFR-7, Yankee Environmental System Inc., Turner Falls, USA]. The goal of the investigation was to provide estimates of the vertical aerosol extinction over the island, both under clean and turbid conditions. Inversion of spectral τ_a allowed to retrieve size distributions, from which the single scattering albedo ω_0 and the asymmetry factor g could be estimated as a function of altitude. These parameters were combined to calculate aerosol forcing in the column. Emphasis is put on episodes of increased turbidity, which were observed at different locations simultaneously, and attributed to outbreaks of mineral dust from North Africa. Differentiation of τ_a as a function of altitude provided the vertical profile of the extinction coefficient σ_e . For dust outbreaks, aerosol extinction is concentrated in two distinct layers above and below the strong subsidence inversion around 1200 m asl. Vertical profiles of τ_a and σ_e are shown in Figure 1 for July 8. In some occasions, vertical profiles are compared to LIDAR observations, performed both at sea level and in the low free troposphere, and to airborne measurements of aerosol optical depths.

Figure 1: vertical profiles of aerosol optical depth AOD (above) and extinction coefficient σ_e (below) measured on 8 July, during a dust outbreak from North Africa.

