ATMOSPHERIC AEROSOL AND THERMAL STRUCTURE IN THE BOUNDARY LAYER OVER THE LOS ANGELES BASIN*

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ABSTRACT

A field study using a mobile lidar was recently conducted in the L. A. Basin, California, to (1) examine the relationship between the vertical aerosol and the thermal structure, and (2) map the vertical aerosol structure in the atmospheric boundary layer over the basin. These data are needed for use in the development of a mixing-depth submodel required for photochemical air quality simulation models. Toward these ends, a series of lidar aerosol measurements in conjunction with balloon and aircraft temperature soundings were taken at a site in El Monte, and in a mobile mode along a 90-mile freeway loop between El Monte, Santa Monica, and Long Beach. The lidar data are presented in the form of time-height and distance-height cross sections. The results indicate that, although aerosol concentrations are frequently present above the base of the marine inversion, these are generally in stratified layers in contrast to the more uniform nature of the lower convective layer, permitting the mixing depth to be distinguished on this basis. The lidar-derived mixing depths are well correlated (within 100 m) with daytime temperature inversions. Other significant features shown by the lidar data include large Basin-wide mixing-depth variations, waves with amplitudes of 200-300 m and wavelengths of 1000-1500 m on the lower aerosol layer, and apparent aerosol "chimneys" with overrunning in the vicinity of convergence zones.

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