Ozone and Aerosol Results Obtained by Airborne Lidar During INTEX-B/MILAGRO Field Experiment: Initial Resutls

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Large-scale distributions of ozone (O_3) and aerosols were measured with a differential absorption lidar (DIAL) on the NASA DC-8 aircraft during the INTEX-B (Phase-A)/MILAGRO (I/M) field experiment, which was conducted from 24 February to 22 March 2006. Remote O_3 and aerosol profiles were simultaneously measured below and above the DC-8 to provide information from near the surface to above the tropopause along the flight track. Multiple-wavelength aerosol backscatter measurements were made to estimate the relative size of the aerosols, and simultaneous aerosol depolarization measurements were made to detect the presence of nonspherical aerosols, such as mineral dust and aerosols in fire plumes. In situ measurements of O_3 were also made onboard the DC-8, and these were used to constrain the interpolation of the nadir and zenith O_3 lidar measurements, which then provided an estimate of the entire tropospheric O_3 profile along the flight track.

The large-scale tropospheric distributions of O_3 and aerosols were obtained on all I/M flights, and plumes from biomass burning in southern Mexico were often observed in the free troposphere over the Gulf of Mexico and over eastern Mexico. These plumes extended from the top of the boundary layer to about 5 km, and they contained enhanced O_3 (>60 ppbv), enhanced aerosol loading (infrared scattering ratios (S) >5), and enhanced aerosol depolarization (total depolarization (D) >10%). The Mexico City (MC) pollution plume was readily apparent with high O_3 (>100 ppbv), high aerosol scattering (S>20), and enhanced aerosol depolarization (D>10%). The top of the MC pollution extended to a depth of about 2.5 km AGL. Some observations showed the MC plume spilling out over the mountains to neighboring regions, but the long-range transport of the MC plume was not readily apparent in the airborne lidar data.

Several coordinated flights were made with the C-130 and J-31, and these flights are expected to yield considerable insight into the characteristics of the air masses remotely measured by the airborne lidar on the DC-8. Large-scale O_3, aerosol, and cloud distributions are also being used to validate measurements made by TES, OMI, and MLS on a number of intercomparison opportunities. This poster discusses the general characteristics of the air masses observed by the airborne lidar during I/M.