Aerosol optical depths from airborne sunphotometry in INTEX-B/MILAGRO as a validation tool for the Ozone Monitoring Instrument (OMI) on Aura

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Aerosol data products produced by the Ozone Monitoring Instrument (OMI) on the Aura satellite include aerosol optical depth (AOD), single scattering albedo (SSA), and aerosol indices. These OMI aerosol products are derived using wavelengths and algorithms that differ significantly from those of other nadir-viewing satellite aerosol-measuring instruments, such as MODIS and MISR. These differences produce some advantages (such as high sensitivity to aerosol absorption and aerosol retrievals over bright surfaces and clouds) and disadvantages (such as dependence on aerosol layer height) that lead to unique needs when validating and improving OMI aerosol retrievals. An example is the desire for measurements of aerosol vertical profiles in conjunction with AOD.

In March 2006 during INTEX-B/MILAGRO (Phase B of the Intercontinental Chemical Transport Experiment/Megacity Initiative-Local And Global Research Observations) the 14-channel Ames Airborne Tracking Sunphotometer (AATS-14) flew on the Jetstream 31 (J31) aircraft. AATS measured AOD at 13 wavelengths (354-2139 nm) and water vapor columns in 13 flights based in Veracruz, Mexico, sampling clean and polluted airmasses over the Gulf of Mexico and Mexico City. Vertical differentiation of AOD and water vapor column data from J31 vertical profiles yields vertical profiles of multiwavelength aerosol extinction and water vapor density. J31 flights were coordinated with overflights of several satellites, including Aqua, Aura, Terra, and Parasol, plus other aircraft, including the NASA DC-8 and King Air and the NCAR C-130. These coordinated flights produced a very rich data set with strong potential for OMI aerosol validation studies during J31-OMI coincidences.

This paper will focus on two J31-OMI coincidences: the J31 flight over the Gulf of Mexico on 10 March and the J31 flight over Mexico City on 19 March. During the 10 March flight, AATS obtained AOD measurements within 30 minutes of satellite overpass during a 20-minute low altitude (60 m ASL) J31 transect at locations corresponding to 8 OMI grid cells where AOD retrievals were performed. During the 19 March flight, AATS measured vertical profiles and horizontal transects of AOD at the T2 site NNE of Mexico City and at the T0 site in the heart of the City, both of which were in OMI grid cells where aerosol retrievals were performed. The suborbital data set is particularly rich, including AERONET retrievals of aerosol properties from T2 and T0, additional aerosol retrievals from radiometers on the J31, and lidar and in situ measurements from the DC-

8. This data set provides not only AOD values for comparison to OMI results, but information on aerosol height, size, and composition for constraining the OMI aerosol retrieval model.