Determination of Area-Averaged Surface Albedo over the MCMA using G-1 Data

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Atmospheric radiative transfer models often require surface albedo values as input. In many cases albedo measurements are not made, yet the radiative transfer practitioner must still assign values to the surface albedo. When actual albedo measurements are made, these are often point measurements and may not be representative of the area surrounding the measurements.

During the MILAGRO Campaign, two Multi-Filter Radiometer (MFR) sensors were mounted on the G-1 aircraft. These measure the total irradiance at six wavelengths: 415 nm, 500 nm, 615 nm, 673 nm, 870 nm, and 940 nm. An "open" silicon detector measures the solar broadband irradiance (over part of the solar spectrum). One of the MFR sensors was mounted looking up, with the other mounted looking down. Data from these two instruments, and data from surface Multi-Filter Rotating Shadowband Radiometers (MFRSR), are used to find the area-averaged surface albedo, at the wavelengths described above. Additionally, the silicon data permit the estimation of a broadband surface albedo.

These data clearly show, for example, that the surface albedo drops noticeably over Mexico City relative to the outlying areas, and that the albedo can change after a rain event. We provide typical values for the albedos at the T-0, T-1, and T-2 sites, and show single scattering albedos derived using the algorithm of Kassianov et al. (2005). These calculations vitally depend on the surface albedo, particularly at the larger wavelengths.