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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comparison of UV-RSS spectral measurements and TUV model runs for clear skies for the May 2003 ARM aerosol intensive observation period" *by* J. J. Michalsky and P. W. Kiedron

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Referee #1 succinctly summarizes two main points of the paper that we intended, namely, that transmittance is a useful tool to study aerosol optical properties in the UV and that it works for small aerosol optical depths.

Specific points:

The abstract now clearly states that we used Langley analysis to establish the top-of-atmosphere response of the UV-RSS, and that we use this and measured irradiances to calculate transmittance.

Section 3: References were added for the ozone profile, aerosol profile, and radiative transfer code (discrete ordinates with eight streams) used in TUV.

17407/21-27: Some discussion in Kiedron et al. (2006) is included to clarify how transmittance was calculated from the measurements.

17408/3,5: Cosine of the apparent solar zenith angle was used to calculate the direct component on the horizontal receiving surface, which includes the refraction correction.

Section 5: It is true that wavelength independent single scattering albedo (ssa) and asymmetry parameter (g) does not follow from Mie theory so we expected some reduction is ssa and some increase in g in the UV. A slightly larger asymmetry parameter for the UV, consistent with Mie theory, was found to minimally increase the diffuse. For half of the cases the reduced ssa was consistent with Mie theory for constant refractive index, but for the others the ssa was lower than expected.

17408/19-23: In earlier calculations we had used 0.034 for the surface albedo. This increased the diffuse transmittance such that the single scattering albedo had to be decrease from 0.971 to 0.831 instead of the change from 0.971 to 0.871 indicated in Figures 2 and 4 to achieve agreement in the calculated and measured diffuse. Clearly, retrievals will be critically dependent on the availability of a good UV surface albedo measurement.

17409/3-4: The higher the asymmetry parameter g the greater the probability that radiation is scattered toward the surface, which increases the diffuse irradiance at the surface.

17411/19: A comment regarding a role for tropospheric ozone was added as a possible reason for the discrepancy of the diffuse irradiance match at shorter UV wavelengths.

The requested style changes were incorporated.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 17401, 2007.

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Interactive Comment