

Comparison of UV-RSS Spectral Measurements and TUV Model Runs for the May 2003 ARM Aerosol Intensive Observation Period

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The first successful deployment of the ultraviolet rotating shadow-band spectroradiometer (UVRSS) occurred during the May 2003 U.S. Department of Energy's Atmospheric Radiation Measurement program's Aerosol Intensive Observation Period. The aerosol properties in the visible range were well characterized using many instruments to determine the column aerosol optical depth, the single scattering albedo, and the asymmetry parameter needed for radiative transfer calculations of the downwelling direct normal and diffuse horizontal irradiance in clear-sky conditions. We used the Tropospheric Ultraviolet and Visible (TUV) radiation model developed by Sasha Madronich and his colleagues at the U.S. National Center for Atmospheric Research for the calculations of the spectral irradiance in the ultraviolet. Since there were no ultraviolet measurements of the aerosol properties, except for aerosol optical depth, the input data used in the radiative transfer model are based on the assumption that we can extrapolate from the visible portion of the spectrum. There is no consensus extraterrestrial irradiance spectrum to use for the TUV model, instead, the measured and modeled transmittance spectra between 300 and 360 nm are compared for seven cases that included variable aerosol loads and high and low solar-zenith angles.

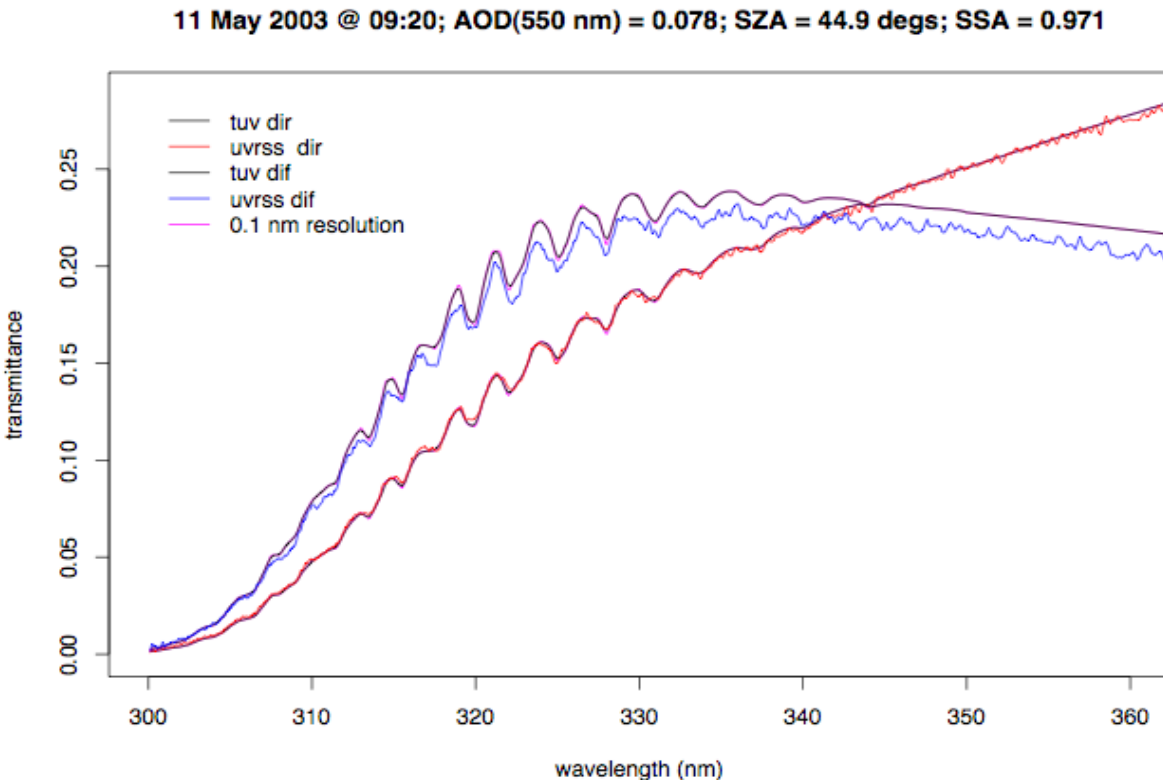


Figure 1. The UVRSS measured direct and diffuse transmissions for the graph's title conditions are in red and blue, respectively. The modeled values at the UVRSS resolution are in black. The magenta lines are at the 0.1-nm resolution of the model. The direct model and measurements agree indicating that extinction is correct; the difference between diffuse model and measurements indicate that model inputs are incorrect.