

Broadband and Spectral Shortwave Radiation Model and Measurement Comparisons

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Shortwave radiation models and measurements have a problem in that models over-predict the measured diffuse irradiance while matching the measured direct beam irradiance. In 2003 an intensive observation period (IOP) to study aerosols over the ARM central site in northern Oklahoma (36.61° N, 97.49° W) was conducted between May 5th and May 30th. Redundant measurements of aerosol properties were made at and above the surface. The first part of this talk summarizes those results and remarks on lessons learned from comparing six models to the surface irradiance measurements. The second part of the talk focuses on efforts to compare measurements and models spectrally. During the IOP two rotating shadowband spectroradiometers acquired data in the ultraviolet, visible, and near-infrared out to about 1.06 μm . A major hurdle in spectral comparisons is matching spectral resolution. Since we will use measurements as the standard we match their resolution, which involves experimentally determining the slit function at every wavelength, and then multiply a sufficiently high-resolution model spectrum by this function and integrate over the slit function to get the resolution to be similar. (Figure 1) shows this a typical comparison in the visible/near-infrared spectrum. The discrepancies and physics behind them will be discussed.

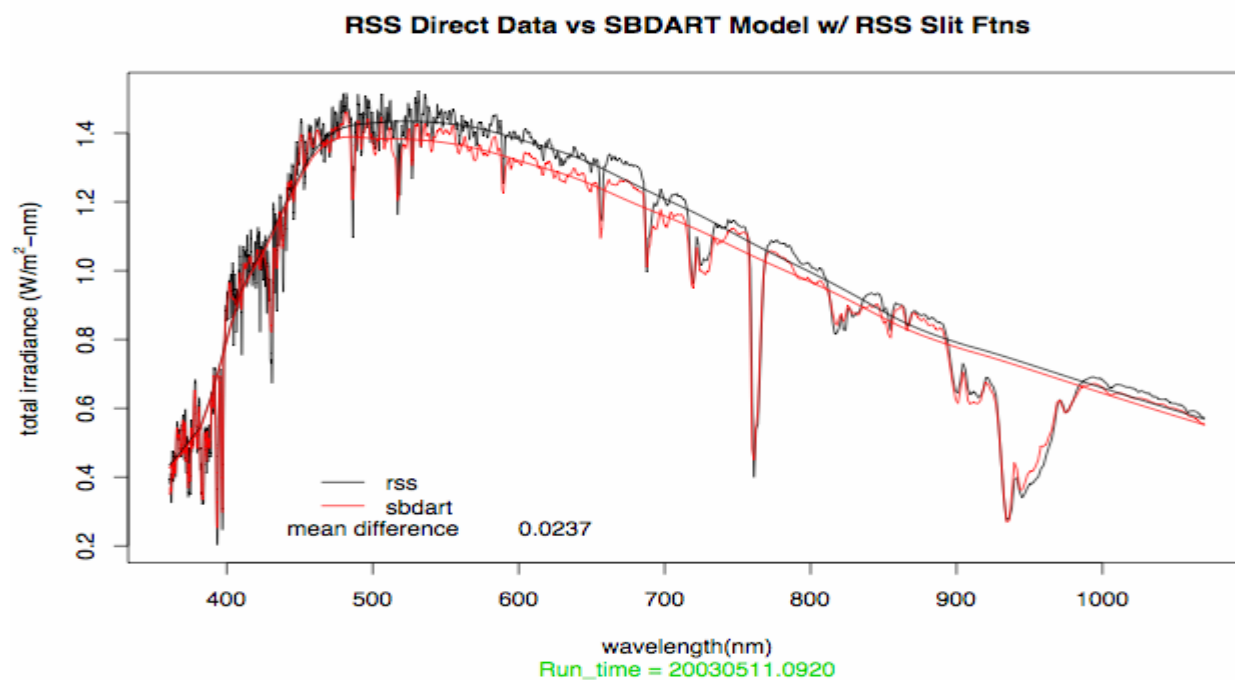


Figure 1. The SBDART-modeled direct solar spectral irradiance using simultaneous measurements of the needed model inputs, most importantly, aerosol, water vapor, and ozone (in red) is compared with measurements from the rotating shadowband spectroradiometer (in black) during the ARM Aerosol Intensive Observation Period (AIOP) in May 2003.