Spectrometer and Radiative Transfer Model Comparison using High Sun In-Situ Observations in Pretoria

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There is need for reliable in-situ spectral solar irradiance measurements. For instance, the spectrally resolved irradiance may be used to infer its influence on radiative forcing of climate and in solar energy applications. In any case, reliable data with relatively short spectral scan times as well as apt spectral range, resolution and sensitivity is necessary. The in-situ data is commonly used to validate solar irradiance models and as metadata to atmospheric radiative transfer models. The scope of this work has therefore been twofold: 1) to explore the suitability of a diode array spectrometer for in-situ spectral global solar irradiance by comparing the system against a performance established Analytical Spectral Devices FieldSpec spectroradiometer and 2) to compare two radiative transfer models and provide clear-sky background data for the spectroradiometric measurements. The considered models are MODTRAN and LibRadtran. Metadata such as the spectral global solar irradiance from the above mentioned instruments, water vapour, aerosol optical depth, humidity and cloud information is used as input into the radiative transfer models. This paper reports on the in-situ spectrometer comparison and the results from the two radiative transfer models.