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Assessing spectral shortwave cloud observations at the Southern Great Plains Facility

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The Atmospheric Radiation Measurement (ARM) program (now Atmospheric System Research) was established, in part, to improve radiation models so that they could be used reliably to compute radiation fluxes through the atmosphere, given knowledge of the surface albedo, atmospheric gases, and the aerosol and cloud properties. Despite years of observations, discrepancies still exist between radiative transfer models and observations, particularly in the presence of clouds. Progress has been made at closing discrepancies in the spectral region beyond 3 micron, but the progress lags at shorter wavelengths. Ratios of observed visible and near infrared cloud albedo from aircraft and satellite have shown both localized and global discrepancies between model and observations that are, thus far, unexplained. The capabilities of shortwave surface spectrometry have been improved in recent years at the Southern Great Plains facility (SGP) of the ARM Climate Research Facility through the addition of new instrumentation, the Shortwave Array Spectroradiometer, and upgrades to existing instrumentation, the Shortwave Spectroradiometer and the Rotating Shadowband Spectroradiometer. An airborne-based instrument, the HydroRad Spectroradiometer, was also deployed at the ARM site during the Routine ARM Aerial Facility Clouds with Low Optical Water Depths (CLOWD) Optical Radiative Observations (RACORO) field campaign. Using the new and upgraded spectral observations along with radiative transfer models, cloud scenes at the SGP are presented with the goal of characterizing the instrumentation and the cloud fields themselves.Abstract