



Towards a direct Derivation of Spectral Irradiance from Satellite Retrievals of heterogeneous Cirrus Clouds

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This study addresses the question whether it is possible to derive spectral irradiance from satellite retrievals of cloud optical thickness and effective radius above heterogeneous cirrus clouds. During the Cirrus Regional Study of Tropical Anvils and Cirrus Layers - Florida Area Cirrus Experiment (CRYSTAL-FACE), the MODIS airborne simulator (MAS) and the Solar Spectral Flux Radiometer (SSFR) operated on the same aircraft, providing a unique data set of radiance fields (MAS) along with the corresponding spectral irradiance (SSFR). The MAS retrievals were used to generate two-dimensional model clouds, which were input into a Monte Carlo radiative transfer model. The modeled irradiance fields were then directly validated against the SSFR measurements. For a set of wavelengths, the impact of three-dimensional effects and the single scattering properties, including crystal shape, is discussed, and a path to new work using satellite data for deriving spectral irradiance above clouds is presented.