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Apparent absorption of solar radiation in heterogeneous tropical cirrus clouds

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We used coordinated measurements of spectral irradiance below and above cirrus cloud fields during the Tropical Composition, Cloud and Climate Coupling (TC4) Experiment (Costa Rica, 2007) and three-dimensional radiative transfer calculations to compare measured and modeled solar spectral absorption along the coordinated flight tracks of the NASA ER-2 and DC-8 aircraft. The cloud fields for the 3D model calculations were obtained by merging MODIS Airborne Simulator (MAS) cloud retrievals and reflectance profiles from the NASA Cloud Radar System (CRS), both onboard the NASA ER-2. We found significant apparent absorption of solar radiation at visible wavelengths, especially near cloud edges, occurring in both measurements and model results. We will discuss the implications of this result for broadband cloud absorption and put it in the context of so-called enhanced cloud absorption, a controversial issue of the past decade.