



Shortwave absorptance in a tropical cloudy atmosphere: Reconciling calculations and observations

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The absorption of shortwave (SW) by clouds is a topic surrounded by contradictory reports. Some studies have shown large discrepancies between observed SW absorption and absorption predicted by models, while others have found no significant difference. In this study, values of column SW absorptance obtained by combining collocated top-of-atmosphere and surface observations at an island site in the Tropical Western Pacific are compared to radiative transfer model (RTM) output. To compensate for the field of view difference between satellite and surface instruments, the surface data are averaged over time. There is a significant discrepancy between the models and observations with the RTMs apparently underestimating SW absorptance. However, there are implications that insufficient averaging of surface data contributes to the observed SW absorption discrepancy. Reexamination of the observational data using the difference between cloud fraction estimated from satellite and surface measurements as an estimate of field of view mismatch supports this hypothesis. We conclude that averaging surface data over three hours or less is not always sufficient to eliminate sampling issues. However, the possibility that shortcomings of the RTMs contribute to the discrepancy in SW absorption values cannot be excluded.