Comparison of Stochastic Radiation Transfer Predictions with Multi-Filter Rotating Shadowband Radiometer Data

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There are many proposed models for estimating the effects of broken cloud on radiative transfer in the context of a general circulation model (GCM). These schemes are required to be very fast and to require only a modest amount of met data. To be worthy of consideration, they must offer improvement over a simple fractional cloud cover (FCC) prediction.

We describe the initial results of the use of multi-filter rotating shadowband radiometer (MFRSR) data from the Atmospheric Radiation Measurement (ARM) Program to compare a model we have proposed (the simplest Pomraning-Levermore [PL] equation set) with FCC. Because the required sitewide solar fluxes are not yet available, we have used five successive days in late May 1993 with roughly similar climatology at the (only available) instrument to stand for five separate readings of the same day. The cloud size data required for PL and the fractional area coverage required for FCC were taken from Geostationary Operational Environmental Satellite (GOES) observations for the same period. As it turned out, conditions for this particular period were such that the two methods give indistinguishable predictions, but the method is established and the expected availability of much more data in the near future should allow definitive results.