

The Radiation Budget of an Atmospheric Column in the Tropical Western Pacific

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We have developed a methodology to compute atmospheric radiation profiles and heating rates continuously at the Atmospheric Radiation Measurement (ARM) sites at Nauru and Manus Island in the Tropical Western Pacific based on measured atmospheric state and cloud property profiles. These calculations define the radiative budget of the column, as well as heating rate profiles. We have performed these calculations for periods of approximately a year at each site. In addition, we are doing similar calculations for the Darwin site during the TWP ICE period (January and February, 2006).

Here, we compare the flux calculations for these columns to measured surface and top-of-atmosphere fluxes. The surface fluxes are obtained from ARM measurements and TOA fluxes from geostationary radiances converted to broad-band fluxes by the NASA Langley research group. Comparisons are carried out for both hourly averages and daily averages at surface and TOA. The comparisons show good agreement with the surface fluxes and with TOA outgoing longwave radiation. The agreement with TOA reflected radiation, however, is considerably poorer.

In addition, we compare these calculations and observations with results from a climate model, the Multi-scale Modeling Framework (MMF), run with specified sea surface temperatures for the same period. The comparisons are carried out on the basis of statistical distributions.