



Evaluation of satellite estimates of downward shortwave radiation over the Tibetan Plateau

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In this study evaluated are state-of-the-art satellite products of downward shortwave radiation over the Tibetan Plateau against ground observations. The satellite products include the International Satellite Cloud Climatology Project - Flux Data (ISCCP-FD) as produced at the NASA Goddard Institute for Space Studies (GISS) from the ISCCP D1 data; the Global Energy and Water Cycle Experiment - Surface Radiation Budget (GEWEX-SRB) results as derived at the NASA Langley Research Center (LaRC) from the ISCCP DX data; and a University of Maryland product derived with a modified version of the University of Maryland Surface Radiation Budget (UMD-SRB) model as implemented with METEOSAT-5 observations. These products are at different spatial and temporal resolutions and the evaluation is performed at the native resolution of each product. Comparisons indicate that the high elevation of the Tibet is of significant importance when estimating downward shortwave radiation; if neglected, errors in the daily mean radiation of 30 W m^{-2} can occur. It is also shown that discrepancies among the satellite products are usually larger in highly variable terrain (such as in the Himalayas region) and smaller for non-variable terrain (such as in the central Plateau). This suggests that errors of satellite products are spatially dependent over the Tibet. Therefore, caution needs to be exercised when extending comparison results based on limited in situ data from accessible sites to the entire Plateau.