# Comparison of TOMS retrievals and UVMRP measurements of surface spectral UV radiation in the United States

http://www.firstlight.cn 2010-09-16

Surface noontime spectral ultraviolet (UV) irradiances during May-September of 2000–2004 from the total ozone mapping spectrometer (TOMS) satellite retrievals are systematically compared with the ground measurements at 27 climatological sites maintained by the USDA UV-B Monitoring and Research Program. The TOMS retrievals are evaluated by two cloud screening methods and local air quality conditions to determine their bias dependencies on spectral bands, cloudiness, aerosol loadings, and air pollution. Under clear-sky conditions, TOMS retrieval biases vary from −3.4% (underestimation) to 23.6% (overestimation). Averaged over all sites, the relative mean biases for 305, 311, 325, and 368 nm are respectively 15.4, 7.9, 7.6, and 7.0% (overestimation). The bias enhancement for 305 nm by approximately twice that of other bands likely results from absorption by gaseous pollutants (SO2, O3), and aerosols that are not included in the TOMS algorithm. For all bands, strong positive correlations of the TOMS biases are identified with aerosol optical depth, which explains nearly 50% of the variances of TOMS biases. The more restrictive in-situ cloud screening method reduces the biases by 3.4–3.9% averaged over all sites. This suggests that the TOMS biases from the in-situ cloud contamination may account for approximately 25% for 305 nm and 50% for other bands of the total bias. The correlation coefficients between total-sky and clear-sky biases across 27 sites are 0.92, 0.89, 0.83, and 0.78 for 305, 311, 325, and 368 nm, respectively. The results show that the spatial characteristics of the TOMS retrieval biases are systematic, representative of both clear and total-sky conditions.

存档文本