

Estimating downwelling surface longwave radiation on a global scale

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A new approach for calculating downwelling surface longwave (DSLW) radiation under all sky conditions is presented. The DSLW model (hereafter, DSLW/UMD) is driven with a synthesis of the latest 10 resolution Moderate Resolution Imaging Spectroradiometer (MODIS) level-3 cloud parameters and information from the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA-Interim model. The DSLW/UMD's clear sky contribution is based on the Rapid Radiative Transfer Model (RRTM), while a statistical cloud structure model and parameterization determine the cloud contribution to DSLW. Daily averaged estimates of DSLW for 2003-2008 along with four commonly used methods based on radiative transfer (RT) theory are compared against ground measurements from the Baseline Surface Radiation Network (BSRN) with emphasis placed on high latitude measurements. When stratified into Tropical, Mid-latitude, and Polar latitudinal belts, largest discrepancies against ground truth are found at high latitudes.