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# Assessment of shadowband correction models under different sky conditions

M.C. Kotti, A.A. Argiriou, and A. Kazantzidis
Laboratory of Atmospheric Physics, University of Patras, Greece (akaza@upatras.gr)

Diffuse irradiance is an important variable for assessing the solar potential of a given location. Diffuse irradiance can be accurately calculated from concurrent measurements of normal beam and global horizontal irradiance. Unfortunately most sites do not measure beam irradiance since it requires more expensive equipment and maintenance due to the tracking system. Therefore alternative methods have been developed. The most common is to measure concurrently the global horizontal and diffuse irradiance using pyranometers, the one that measures diffuse irradiance equipend with a shading device that blocks the beam component from the sensor. Shading devices may be either shade disks or shadow bands. Depending on the device type except of the sun disk a smaller or larger portion of the sky vault is also obstructed. This additional obstruction results to a reading of the diffuse radiation smaller than in reality. Shadowbands are simpler compared to shade discs and therefore widely used. An inherent problem to the shadowband is that the additionally shaded portion of the sky is not negligible. Also, because of the anisotropy of scattered irradiance, presenting a maximum closer to the sun disk, this shaded part may mask an important percentage of the diffuse irradiance. Therefore diffuse irradiance readings need to be corrected.
Correction models are usually based and evaluated on measurements made in the country that developed each model. Correction models generally consider the shadowband's geometry and make an assumption regarding the sky radiance distribution. The performance of the models is assessed by comparing the corrected diffuse radiation values to those calculated from global horizontal solar irradiance using an identical pyranometer and concurrent measurements of beam irradiance. In this work four correction models (Drummond, LeBaron, Battles, Munneer and Zhang) have been applied to irradiance data from Athens, Greece. One-year irradiance data from the National Observatory of Athens for the year 2000 were used. The data consist of 1 min values of global and diffuse horizontal irradiance and also beam irradiance. The results have been evaluated both graphically and statistically under different sky conditions. It was found that the Battles and the LeBaron model are the best performing ones for all sky conditions. This is in agreement with the findings of other studies testing shadowband correction models for other locations at the northern hemisphere.