

A Proposed Working Standard for the Measurement of Diffuse Horizontal Shortwave Irradiance

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Atmospheric radiative transfer model estimates of diffuse horizontal shortwave (solar) irradiance have historically been larger than measurements from a shaded pyranometer. A reference standard for the diffuse horizontal shortwave irradiance does not currently exist. There are no current efforts to develop a measurement standard that are known to the authors. This paper presents the case for a working standard for this measurement. Four well-behaved pyranometers from two previous intensive observation periods (IOP) were included in this study. The instruments were characterized for spectral and angular response before the IOP and calibrated during the IOP using a shade/unshade technique with reference irradiance from an absolute cavity radiometer. The results of the comparison and attempts to explain the differences suggest selecting three of the four for the working standard. The 95% uncertainty of the working standard is conservatively estimated at $\pm 3.1\%$ of reading + 0.8 W/m^2 . In lieu of a comparison to this trio, a reasonable method for obtaining quality diffuse horizontal shortwave irradiance is suggested.

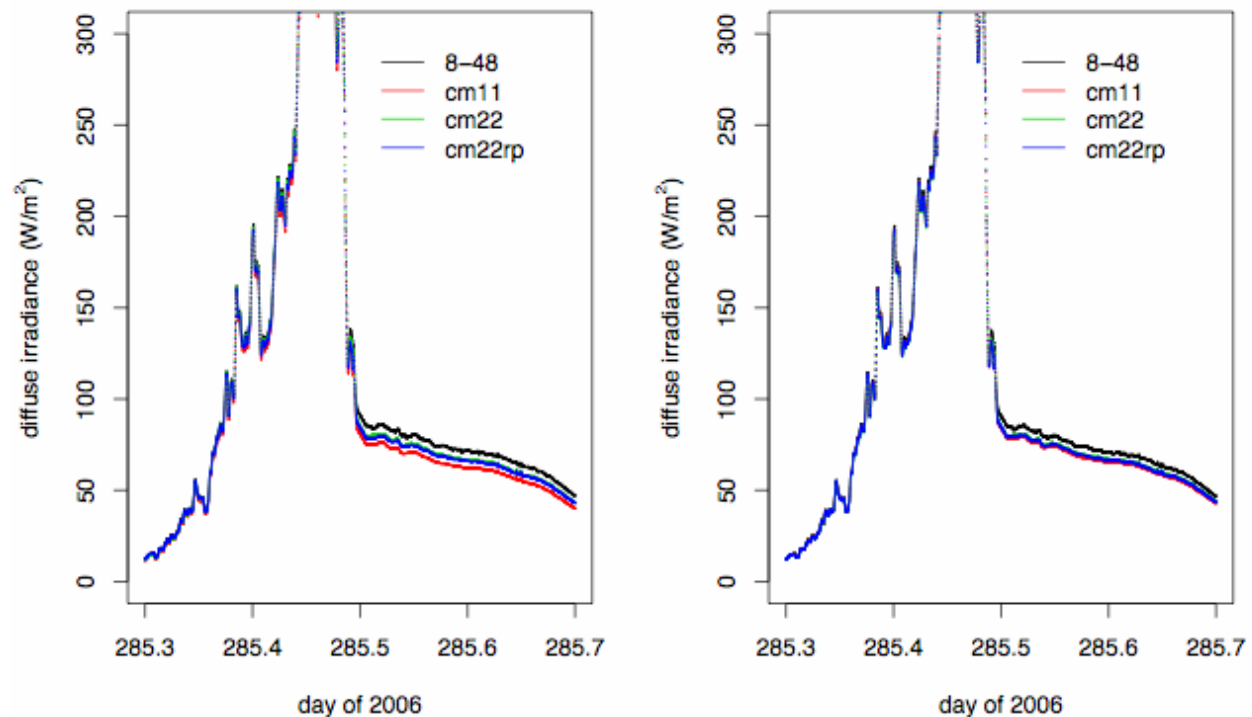


Figure 1. Diffuse horizontal shortwave (solar) irradiance for a day with a completely cloudy morning and completely clear afternoon. Four measurements over-plotted before correction (left) and after correction (right). Note the agreement in the morning followed by the 8-48 reading higher than the others in the afternoon (by about 5%). The three that agree were chosen for the diffuse standard.