A New Sunshine-based Global Solar Radiation Estimation Model for Trinidad

R.J. Stone

Abstract

Six sunshine-based models for estimating monthly mean daily global solar radiation on a horizontal surface were evaluated using 175 months of data collected at the Piarco Meteorological Station in Trinidad, W.I. (10.58°N, 61.35°W). The models involved in the study were those of Black et al., Glover-McCulloch, Smith, Rietveld, Bahel et al., and Akinoğlu-Ecevit. The results indicated that all the models provided estimates that were significantly different from the corresponding measured values (α=0.001). The order of decreasing predictive accuracy was Black et al., Bahel et al., Rietveld, Akinoğlu-Ecevit, Smith and Glover-McCulloch respectively. A new Ångström-type regression model was developed, tested and generally provided estimates with ± 5% accuracy. The model is $\overline{H} \,/\, \overline{H}_{\circ}$ =0.277 + 0.366 ($\overline{n}/\overline{N}$). It is recommended for use in Trinidad.