

Measurement Uncertainty Analysis of Temperature Based Solar Radiation Estimation Models

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Abstract: Solar radiation is the main energy source for activities in the earth. It is important that the solar radiation values are known accurately. In cases where parameters about solar radiation cannot be measured, solar radiation estimation models are used. These are mathematical functions derived from the measured meteorological parameters. In this study, temperature-based estimation models that commonly used in the literature were examined, and uncertainty analysis of the models were applied. These solar radiation estimation models are Allen model, Hargreaves model, Chen model and Bristow–Campbell model. These models calculate the total global solar radiation with the difference between the maximum and minimum air temperatures. Measurement uncertainty budgets of the models and an example calculation can be found in the study.

Keywords: Solar radiation; Allen model; Chen model; Bristow–Campbell model; Hargreaves model; Maximum temperature; Minimum temperature; Uncertainty budget