

Relation between daily total solar radiation and sunshine duration at eleven sites in Thailand from 1997 to 2000

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ABSTRACT

Solar radiation is the main energy input for ground surface and vegetation, since net radiation would be about 70 - 80% of solar radiation. The energy would play the important role in sensible heat flux and latent heat flux or evapotranspiration. Although the regional and long term measurement of solar radiation have not been carried out in most countries, not only in Thailand. Hence we have been carrying out the measurement of global solar radiation using 11 sets of solarimeter and data logger from May 1997 at eleven Agro-Meteorological (Agro-Met) stations of TMD in all over Thailand. The solar radiation of every 10 minute based on every one minute logging have been collected from May 1997 to April 2000, and converted into daily total solar radiation. As for the amount of monthly average solar radiation, another paper will be presented at this workshop.

The objectives of the present study are (1) to find out the relationship between daily solar radiation and sunshine duration in each month of year, and (2) to develop the experimental model for estimation solar radiation by using data of daily sunshine duration which have been measured for about 20 years at 43 Agro-Met stations in Thailand. If the effective model will be developed, the regional and long term solar radiation would become possible to estimate.

The relation between daily solar radiation (SOL) and daily sunshine duration (SUN) showed mostly linear relation in each month and each station. The intercept value of solar radiation at zero sunshine duration (SOL-0) and the solar radiation at the sunshine of 10 hour/day (SOL-10) in SOL - SUN relation are analyzed. Monthly changes in SOL-0 and SOL-10 at each station showed the similar tendency in different years. In generally, the values of SOL-0 and SOL-10 showed its maximum during May to Aug, and its minimum in Jan. and March. The similar pattern of monthly transitions of SOL-0 and SOL-10 are found between Chaing Mai (CM) and Nan (NN), Lampang (LP) and Tha Phra (TP), Pak Chong (PC) and Kamphang Saen (KP). It is also found that monthly changes in SOL-0 and SOL-10 are caused by the magnitude of SUN. The similar relation between SOL-0 and SOL-10 with SUN are found for both stations above mentioned. Then SOL-0 and SOL-10, accordingly the daily solar radiation, would be estimated by daily sunshine duration.