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TREENUCH JANTARACH : DEVELOPMENT OF A DAYLIGHT MODEL FROM SATELLITE DATA. THESIS ADVISORS : ASSO. PROF. SERM JANJAI, Ph.D. , AND JARUNGSANG LAKSANABOONSONG, Ph.D. 129 pp. ISBN 974-653-059-3.

In this work, models for computing global illuminance from GMS5 satellite data were developed. A one-year period data of hourly global illuminance ( $E_{Gh}$ ) measured at 4 ground-based stations namely Chiang Mai, Ubon Ratchatani, Nakhon Pathom and Songkhla were collected. For the satellite data, hourly digital data from the visible channel of the GMS5 satellite collected at the same period of the illuminance data were used in this work. Nine pixels centered at the ground-based stations were cut from the images and used as target areas under this investigation. The post-launched calibration tables were employed to convert gray levels of these target areas into the earth-atmospheric albedo ( $\rho$ ). Surface albedo ( $\rho_g$ ) and maximum cloud albedo ( $\rho_c$ ) of the target areas were also calculated for each month. Hourly cloud index ( $n$ ) defined as the ratio of the difference between  $\rho$  and  $\rho_g$  to the difference between  $\rho_c$  and  $\rho_g$  were computed for each target area. Then the value of  $E_{Gh} / E_{Gh,clear}$  calculated previously were correlated to the cloud index ( $n$ ). The model was used to compute  $E_{Gh}$  measured at Asian Institute of Technology (AIT) for the period of one year. It was found that the root mean square difference (RMSD) between  $E_{Gh}$  calculated from the model and those obtained from the measurement is equal to 14.46 klux or 18.06% of the yearly mean values of global illuminance. Rather than using the hourly values of  $E_{Gh}$  of each day, monthly average values of global illuminance are usually required for energy conservation applications. Therefore, a model relating the monthly average hourly global illuminance to monthly average hourly cloud index was also formulated. This model was again tested using AIT data. The values of monthly average global illuminance computed from the model were compared with those obtained from the measurement. It was found that RMSD is only 4.74 klux or 6.32% of the yearly mean values of global illuminance. This result shows that the performance of the model is significantly better than that for case of hourly values.