

Estimation of spatial/temporal variations of rainfall over Indonesia maritime continent using satellite IR data

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Possibility of estimating Indonesian rainfall using GMS IR data has been examined. *Minimum cloud top temperature ($T_{bb_{min}}$)* and fractional cloud coverage at $220^{\circ}K$ threshold temperature (FC_{220}) for the time scale and spatial scale of 6-hrs and $0.25^{\circ} \times 0.25^{\circ}$ has been used to generate a simple linear estimation model. The threshold for classifying clouds into *rain* and *no-rain clouds*, was determined by using statistical values of *critical success index (CSI)*, *false alarm rate (FAR)*, *probability of detection (POD)*, and *proportional correct (or hit rate, HR)*.

Temperature of 220 K is the best threshold to distinguish “rain” and “no-rain” cloud over Indonesia. The simple linear estimation model based on $T_{bb_{min}}$ and FC_{220} give correlation coefficient of 0.62 and root mean square error of 11.8. The estimated and observed rainfall amounts are accumulated into 12 and 24-hrs, the correlation coefficient is increased to 0.67 and 0.79, respectively. Examining the model to estimate daily rainfall for other area gives a value of correlation coefficient of 0.53 - 0.75 for rainfall observed in Jawa, and only 0.29 - 0.37 for rainfall observed in Sumatera and Kalimantan.

The best threshold 220 K found in this study for Indonesia region is colder than the thresholds which were based on studies for the other regions by other scientists and have been used for global rainfall estimations such as GPI and GPCP. Existence of diurnal cycles of cloud generation almost every day over Indonesia seems to be important to explain this difference. Many clouds reaching the lower (warmer) thresholds used in the other studies are stratified (anvils) in Indonesia, and only sufficiently higher (colder) clouds may produce rainfalls. Geographical, intra-seasonal, annual and inter-annual differences of the diurnal cycle cloud characteristics are studied to confirm consistency with the differences of rainfall estimation accuracy.

