



Characteristics of rainfall and cloud over the tropics

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Using TRMM 3G68 and infrared data of geostationary satellite, we study the characteristics of rainfall and cloud over the tropics. Many studies have shown that diurnal variation of rainfall is significant over the tropics especially land area. Our analysis demonstrates the semi-diurnal variation of rainfall over the tropics. The semi-diurnal variation was studied in relation to deep convective cloud (DC) defined by infrared data.

We construct mean hourly rainfall from 14 years of TRMM 3G68 over the tropics. The data shows both diurnal and semi-diurnal variation of rainfall depending on the location. Semi-diurnal variation is seen over the southern Africa and Amazon region during DJF both in PR and TMI data. Further, the data indicates that afternoon primary peak is dominant by convective rain, while the morning secondary peak is consisting of a larger percentage of strati-form rain than convective rain. Brightness temperature (TBB) threshold has been conventionally used to identify (estimate) rainfall. We have employed several TBBs for rainfall that show the existence of only diurnal mode with no semi-diurnal mode over southern Africa and the Amazon region. Here, we inspected mean size and number of DC defined by a TBB of 213K within the area. While, mean size of DC indicates clear semi-diurnal mode, the number of DC within the area shows weak semi-diurnal mode. Afternoon primary peak of rainfall coincides with the time when the mean size of DC is rapidly increasing with the largest number of DC over the area. This suggests that convective rain is associated with the developing stage of DC. These characteristics of mean size and number of DC are seen over both southern Africa and the Amazon.

Over southern Africa, the morning secondary peak of rainfall coincides with the time of the secondary peak of mean size (almost comparable with primary peak) and number of DC. While the morning secondary peak over the Amazon coincides with the primary peak of mean size of DC with the secondary peak of number of DC. These suggest morning peak is associated with larger size of DC that is typical for strati-form rain.

Semi-diurnal variation of rainfall is also found over the ocean area along the ITCZ.