

What we have learned by TRMM LIS/PR observations?

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Thunderstorms observed by TRMM/PR and LIS have been investigating, and Lightning Research Group of Osaka University (LRGOU) has unveiled several interesting features.

Correlation between lightning activities and the snow depth of convective clouds may follow the power-five law. The power five law means that the flash density is a function of the snow-depth to power five. The definition of snow depth is the height of detectable cloud tops by TRMM/PR from the climatological freezing level, and it may be equivalent to the length of the portion where the solid phase precipitation particles exist. This is given by examining more than one million convective clouds, and we conclude that the power five law should be universal from the aspect of the statistic.

Three thunderstorm active areas are well known as 'Three World Chimneys', and those are the Central Africa, Amazon of the South America, and South East Asia. Thunderstorm activities in these areas are expected to contribute to the distribution of thermal energy around the equator to middle latitude regions. Moreover thunderstorm activity in the tropical region is believed to be related with the average temperature of our planet earth. That is why long term monitoring of lightning activity is required. After launching TRMM we have accumulated seven-year LIS observations, and statistics for three world chimneys are obtained. We have recognized the additional lightning active area, and that is around the Maracaibo lake in Venezuela. We conclude that this is because of geographical features of the Maracaibo lake and the continuous easterly trade wind.

Lightning Activity during El Nino period is another interesting subject. LRGOU studies thunderstorm occurrences over west Indonesia and south China, and investigates the influence of El Nino on lightning. We compare the statistics between El Nino and non El Nino periods. We learn that the lightning activity during El Nino period is higher than non El Nino period instead of less precipitation on the ground during El Nino period. Since we expect the strong correlation between precipitation and lightning activity, the results seem to be against the conventional common sense. However analyzed results for these two areas show no contradictions, or we can say that the results are exactly same from the aspect of statistics. The meteorological comprehension is still remained.