

Lightning observation by OTD and TRMM/LIS

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In this study, we introduce some results obtained by the TRMM/LIS and OTD. First, global lightning flash rate are evaluated by combining the data from the TRMM/LIS and OTD. A statistical examination of LIS/OTD lightning data reveals that an average of 48 flashes with an error of 8 occurs around the globe per second, which is well below the traditional estimate of 100 flashes per second. Second, a cross sensor comparison of the LIS is conducted. The mapping of the lightning optical pulse detected by the LIS is compared with the radiation sources by the Lightning Detection and Ranging (LDAR) system at KSC and the National Lightning Detection Network (NLDN). The temporal and spatial differences are examined. The location differences are about 4 km for cloud flash and 12 km for ground flash. The LIS records the subsequent return stroke or K-change component for ground flash, and records cloud flashes at higher altitude. Third, the relationship between radar cloud height and lightning flash rate is examined using the data from TRMM/Precipitation Radar and LIS. The relationship between thunderstorm height and flash rate is quite non-linear with large variance. The overall trend shows that flash rate increases exponentially with storm height. Some tall thunderstorms do not have large flash rates but the reverse situation never occurs. The fifth power dependencies that is derived from scaling law is not inconsistent with, but not necessarily required by, the observed data.