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论文

卫星观测到的全球闪电活动及其地域差异

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摘要 闪电活动在时间和空间尺度上都有很大的可变性. 本文利用热带降水测量计划（TRMM）卫星上携带的闪电探测系统获取的闪电定位资料首次对一些典型地区的闪电活动进行了对比分析. 研究发现不同地区的闪电活动无论在闪电频数或放电强度方面都有很大的差别，海洋上的闪电活动频数与陆地上的闪电活动频数可相差几十倍；不同地区闪电活动的多少不仅取决于该地雷暴日数的多少，更重要的还取决于该地每次雷暴过程闪电频数的多少；不同地区的闪电放电强度有随闪电频数增加而减小的趋势. 进一步研究还表明，不同地区闪电光辐射能的不同可以用对流最大不稳定能量（ECAPE）来解释，闪电放电强度与ECAPE之间存在非常好的线性正相关；而闪电活动频数对ECAPE的响应则与闪电光辐射能不同，二者之间没有发现明显的相关.

关键词 闪电活动 TRMM卫星 闪电探测器 地域差异

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GLOBAL LIGHTNING ACTIVITIES AND THEIR REGIONAL DIFFERENCES OBSERVED FROM THE SATELLITE

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Abstract The lightning activity changes greatly in temporal and spatial scales. We use the data from the lightning imaging sensor, boarded on the Tropical Rainfall Measurement Mission (TRMM) satellite, to study the lightning activities in several typical regions in the world. It is found that great differences exist in various regions for both the flash rate and flash intensity. The flash rate on the ocean is tens to hundred times smaller than that on the continent. The number difference of lightning activities in different regions is caused by not only the thunderstorm number but also the flash rate in an individual thunderstorm. The discharge intensity shows a decreasing tendency with the increase of flash number in different regions. Further studies show that the difference of flash optical radiance between different regions can be interpreted by the local Convective Available Potential Energy (ECAPE). The optical radiance is linearly related to the ECAPE value for different regions, but no obviously correlation is found between the flash frequency and the ECAPE value.

Key words Lightning activity;TRMM satellite;Lightning imaging sensor;Regional differences.

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