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## Lightning Activity in China and Its Optical Characteristics Observed by Geostationary Satellite

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Lightning now has designated as an Essential Climate Variable in the Global Climate Observing System to understand the climate change. Lightning detection from geostationary satellites enables continuous monitoring of lightning activity. The satellite-borne lightning imagers take advantage of optical imaging technology combined with multiple filtering methods to extract the weak signals of lightning from very strong background signals and eventually clustering to reconstruct the original lightning flashes. By using the observation data of Fengyun-4A Lightning Mapper Imager (LMI), the first geostationary satellite-borne lightning imager developed in China, the lightning activity and the optical characteristics of lightning flashes in China were analyzed. The lightning activity observed by LMI exhibits obvious regional, seasonal and diurnal variation properties. The flashes are mainly concentrated in the southeastern coastal region in China and the southwestern China. During the pre-monsoon period (March-May), LMI detected lightning outbreaks in southwestern China and its surrounding areas, while during the monsoon period (June-September), both eastern southwestern China and southeastern coastal region in China show a significant dense distribution of lightning flashes. The climatic characteristics of lightning activity and the simultaneous observations of Lightning Imaging Sensor (LIS) on the International Space Station (ISS) confirm the LMI observations. However, there is a difference between the absolute amounts of the LMI and LIS observations. The overall number of lightning flashes observed by LMI is relatively lower than that observed by LIS. In addition, the detection capability of LMI is higher at low latitudes compared to mid-latitudes, and is higher during daytime hours than that during nighttime hours. As for the flash properties, which mainly refer to the optical radiance, area, and duration of lightning flashes, there are also regional differences for these properties observed by LMI. The high values of flash properties are concentrated in southern China. The LMI observations are related to the radiometric response of its detector and the difference in spatial resolution within the large field of view of geostationary orbit observations.