

# Characteristics of cloud-to-ground and intracloud lightning over Beijing

November 11 2016

---

Lightning is a natural electric discharge phenomenon consisting of cloud-to-ground (CG) and intracloud (IC) flashes, and accounts for many human casualties and significant property damage worldwide every year. Lightning activity is closely associated with severe convective events, such as the 21 July 2012 torrential rainfall event in the Beijing Metropolitan Region (BMR). The study of lightning statistical characteristics is of great importance for lightning protection and thunderstorm forecast.

Due to the technological limitations of detecting IC [lightning](#), previous statistical analyses of lightning characteristics usually use only the CG lightning data, though the IC lightning generally occurs more frequently than CG lightning. With the rapid development of lightning detection systems of both CG and IC lightning in recent years, statistic studies on both CG and IC lightning have been carried out.

What are the characteristics of lightning statistic in the BMR when both CG and IC lightning are considered? In order to answer this question, scientists from Institute of Atmospheric Physics/CAS and the University of Maryland in the U.S. used CG and IC lightning observations from the SAFIR-3000 (Surveillance et Alerte Foudre par Interférométrie Radioélectrique) to investigate the statistical characteristics of the CG and IC lightning over the BMR from 2005 to 2007.

Their results show the presence of 299 lightning days with 241,688 flashes, most of which were IC lightning flashes. Only 19 percent of the

total flashes were CG lightning flashes, of which 14 percent were positive CG. Most lightning activity occurred during the summer months from June to August, with a major diurnal peak around 19:00 BST and a secondary peak around 23:00 BST. Spatial variations in flash density and lightning days both exhibited an increasing southeastwardly pattern, with higher flash densities or more lightning days occurring in the southeastern plains and lower values distributed on the northwestern mountains.

Moreover, significant topographic effects on the spatiotemporal variations in lightning activity are emphasized by their study. That is, flash counts on the northeastern and southwestern mountains peaked in the afternoon, whereas those on the southeastern plains peaked in the late night to early morning, which could be attributed to the propagation of thunderstorms from the mountains to the plains. The results showed that the SAFIR-3000 lightning data (including CG and IC lightning) are more useful than CG lightning data for forecasting the development and propagation of thunderstorms over the BMR.

The results have been accepted for publication in the *Journal of Applied Meteorology and Climatology*.

**More information:** Fan Wu et al, SAFIR-3000 Lightning Statistics over the Beijing Metropolitan Region during 2005-2007, *Journal of Applied Meteorology and Climatology* (2016). [DOI: 10.1175/JAMC-D-16-0030.1](https://doi.org/10.1175/JAMC-D-16-0030.1)

Provided by Chinese Academy of Sciences

Citation: Characteristics of cloud-to-ground and intracloud lightning over Beijing (2016, November 11) retrieved 25 April 2024 from <https://phys.org/news/2016-11-characteristics-cloud->

[to-ground-intracloud-lightning-beijing.html](#)

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.