

Authors reply to reviewers' comments

Reviewer #1:

Most of the reviewer's comments to this manuscript have been well addressed by the authors, and the quality of the revised manuscript has been improved significantly. However, the authors still retained the +CG flashes (strokes) with currents less than 10 kA as part of the CG dataset, which may lead to serious “contamination” for the CG dataset. It is suggested to further analyze the peak current distribution characteristics for +CG and -CG strokes and propose appropriate CG dataset quality control.

Response: In the latest round of revisions, we have considered the suggestions from two reviewers and once again excluded strokes with current less than 10 kA. As a result, there may be some fluctuations in the numerical values in Table 1 and the displayed results in the images. However, the overall conclusions remain largely unchanged.

Reviewer #2:

This round of revisions primarily involves two main changes. Firstly, we removed +CG strokes with peak currents less than 10 kA. Secondly, we have corrected the previous data error by changing the statistics from lightning flashes to lightning strokes. However, the detection efficiency for strokes in our system is notably low, and the ratio between strokes and flashes is approximately 1.3. Also since we have also removed part of +CG strokes, the number changes are not substantial.

1. The new version of the paper changes substantially according to the authors responses to the reviewers:

They say for example to Reviewer 2: “This article has three major changes. Firstly, based on the feedback from the first reviewer, the statistics on lightning flash have been modified to statistics on lightning strokes. Secondly, due to the long review period, new data for another year has been obtained, expanding the data collection period to seven years (2016-2022). As a result, the relevant statistical values have undergone slight fluctuations, and the figures have been adjusted accordingly.”

They also say to Reviewer 1: “Therefore, the entire text has been reprocessed, shifting from analyzing lightning flashes to analyzing lightning strokes. Consequently, the focus is no longer solely on the location and current of the first stroke, but rather on the locations and currents of all lightning strokes.”

However, I see the same figures in the new version of the paper: Figure 2 does not change at all, although all strokes are now considered and one more year of data is used. The number of strokes is generally in average two times that of flashes (multiplicity 2 for CG flashes, in average and for all CG flashes). All figures are identical to the previous ones, so we cannot consider them for a new review.

Response: We sincerely apologize for the carelessness of invoking the previous flash

data by mistake in our codes in the last round of revisions and have taken repeated measures in this round to ensure that such errors do not occur again. We have modified Figures 2-6 and 9 based on the new data, while the data invoked in Figures 7-8 are correct. The number of lightning strokes has increased compared to the previous version; however, due to the relatively low detection efficiency of CNLNDN, the number of strokes does not double that of lightning flashes. Furthermore, for Figure 2, the changes are not very pronounced as the axes are logarithmic.

2. By considering the previous comments I made and the responses of the authors, I see remaining comments which the authors say to have deleted or modified.

For example, in the abstract, I see “lightning current” instead of “peak current” at lines 22, 31 and 33; then at many places within the paper.

Response: We conducted a comprehensive search and revision of the entire document and changed “lightning current” to “peak current”.

For the proportion of the positive CG strokes (now strokes) I see in several graphs the proportion in values < 1 as a ratio and in the text in %. I think the graphs must be changed.

Anyway, if we take into account the changes described by the authors, all figures must be changed since they are exactly as in the previous version of the paper.

Response: The scales for Figures 3, 5, 7, and 9 have all been modified to be in percentage format, and the textual descriptions of decimals in the text have also been changed to percentages.

3. On the general speaking, English must be improved:

Some examples:

Line 2 and many places in the paper: “+CG and -CG strokes” (if you say “and” two kind of stroke)

Response: Sorry. I did not figure out the meaning of this suggestion.

Line 15: “monthly scale” is during one month (as at the scale of the life is along the life). They want to say “at the annual scale”, it is related to Figure 3 and the same mistake is made in the caption of the figure. This kind of mistake must be checked.

Response: Thanks for your reminder. The corresponding contents have been modified.

Line 90: in this new comment, there is something which is not relevant and does not correspond to the result cited from the referenced work: “the detection efficiency for lightning flash and stroke in Beijing was reported to be 36.5% and 49.4%” Usually, the detection efficiency is lower for strokes because if one stroke is detected from a flash (and not other strokes of the flash) the flash is detected, it is a typical result, but we can imagine an opposite result according to the strokes detected. Anyway, the authors (Srivastava et al., 2017) do not say that, the result is not well reported. They make the difference between CG and IC flashes with these proportions. Revise that please.

Response: Unfortunately, we made an error in citing the data, and actually, the detection efficiency for strokes should be lower than that for lightning flashes. This has been corrected. See Line 91.

Line 132: “in China” should be better.

Response: Thanks for your reminder. It has been revised.

Table 1: “k” is strangely used. We can suppose it is one thousand, but it is not common. Use the power of 10 for the related parameters in the first column.

Response: Thank you for your reminder. The necessary changes have been made to the table. Additionally, due to the exclusion of +CG strokes with currents less than 10 kA, there have been slight alterations in the numerical values in the statistical results.

The caption must be rephrased: “Tab. 1 Statistics on the annual average numbers of return strokes, the stroke densities, and the peak current values of the four regions”

Response: Thank you for your suggestion. The corresponding content has been modified.

Line 166: “Region-I has the highest concentration of CG stroke, with an average density of up to 1.69 km⁻² yr⁻¹” If it is an average (over time and area) there is only one value, do not use “up to”.

Response: Thanks for your reminder. It has been revised.

Line 186: what is “degenerate”?

Response: It has already been changed to "degenerative", which refers to a tropical maritime air mass that has undergone alterations in temperature, humidity, or other properties.

4. I let the authors to clarify the new figures which are the same than the previous ones in spite of the use of one more year and strokes instead of flashes.

Response: Table 1 and Figures 2-7 and 9 have been corrected according to the new data.