[Reviewer 1]
I'm satisfied that the authors have addressed my comments. I now think the paper is pretty much ready to publish. A few final remarks below:

L112 “new here we” – I think some punctuation is required?
L423 – “few flashes” → “fewer flashes”?

Thanks for your comments. We have revised these two remarks.

Regarding IC relationships, I think you've missed an opportunity to elevate this paper by: 1) not highlighting in the text the negative result you have for the previous parametrisation of IC/CG ratio (Price and Rind 1993), 2) not providing an equation that enables modellers to make use of the positive relationship with sqrt(CAPE) you've found.
I'm not aware of modellers (of the large-scale) ever using anything other than the price and rind 1993. It'd be good to offer them another option, but perhaps that's future work. As you do say in the paper, maybe this needs to be applied to a broader region using ENTLN or something first.

Thanks for your comment. We now include the equation in the Figure 4 caption. Also, we added new text to the lightning parameterization discussion. We now mention that we may provide models with another option besides Price and Rind (1993) under Figure 4:

“Price and Rind (1993) found that the ratio of CG to IC lightning is related to the cold cloud thickness rather than the height of the freezing level. The cold cloud thickness method has been applied to models to estimate the production of nitrogen oxides by lightning (e.g., Price and Rind, 1994; Goldberg et al., 2022; Pérez-Invernón et al., 2023). The relationship found here between CG fraction and $\sqrt{CAPE}$ if verified with additional lightning data sets over a broader area would provide an alternative approach for parameterizing the ratio of CG to IC lightning in chemistry and climate models.”

[Editor]
Thank you for your revisions in response to the reviewers. Please make sure that you address the final technical corrections put forward by Reviewer #1. In addition, please add clarification on the following points in section 3.1:

- you mention that you shuffle the data before training and cross-validation. In that case, spatial and temporal autocorrelation could be an issue if samples in the training data are near in time and/or space to samples in the test/validation data. Could this be an issue here? Please add clarification on this point. At least a critical reflection on this potential limitation is required.
Thanks for your comments. We do not regard this a major concern here, as we only use data at a fixed location, the SGP region, and thus spatial auto-correlation is not an issue. As for the temporal auto-correlation, we selected all hours with convective clouds detected at the ARM SGP site. Generally, these hours are not continuous, thus the temporal auto-correlations are small. We used the RepeatedStratifiedKFold classifier to get the best performance and the random shuffle is an automatic and necessary step. In order to address readers’ concern, we have added a sentence to explain this: “Our model only simulated the convective hours over SGP, when convective clouds are detected from ARM SGP site, which won’t cause temporal

auto-correlation since convective clouds do not occur frequently (817 hours in total among 9 summers).”

- Concerning the hyperparameter optimization: it is unusual for the default parameters to perform best for a machine learning optimization, especially min_samples_leaf=1 will usually tend to overfit the data. For reproducibility, please extend more on which parameters you varied and what your specific search ranges/intervals were. Currently, your description would make it hard to reproduce your results: "We tried several options but found that the default parameters performed best. For example, we varied the number of trees (10, 50 and 100), the tree depth (5, 10 and “none”) and other criteria."
Thanks for your comments. We added a table to show the results of our model with different parameters. From the table, it is clear that the default parameters provide the best or nearly the best result. Since random shuffling can affect the performance, we have chosen to use the default parameters. We tried four values for min_samples_leaf and found the best results (highest accuracy and AUC) when the default value was used (see Table 1).