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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Assessing and improving cloud-height based parameterisations of global lightning flash rate, and their impact on lightning-produced NO_x and tropospheric composition" *by* Ashok K. Luhar et al.

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Thank you to the authors for their work. I appreciate their bringing together these details regarding the cloud-top height scheme, and its importance in atmospheric chemistry models.

I have a comment relating to p3(L26-29) and p25(L29-31).

From the evaluation of Clark et al. (2017), I would say that there is not much between the PR92 scheme and the Yoshida et al. (2009) scheme based on cold-cloud depth

(CCD). The CCD scheme does, however, show a much smaller increase in lightning activity in the climate change projections.

The CCD scheme incorporates the freezing level, and indirectly relates to the climate change effects on cloud structure and cloud ice. Therefore, I see it as an important lightning scheme that includes the popular cloud-top height variable but also doesn't ignore potential changes in cloud structure under climate change.

Have the authors considered the scheme? And I would like to suggest that this alternative approach to modifying the cloud-top height-based lightning scheme is at least presented and discussed in their paper.

Clark et al. (2017) GRL. https://doi.org/10.1002/2017GL073017

Yoshida et al. (2009) JGR-Atmos. https://doi.org/10.1029/2008JD010370

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