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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Lightning and convection parameterisations – uncertainties inglobal modelling" *by* H. Tost et al.

Anonymous Referee #1

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I am grateful for the authors' detailed reply. Most of my specific comments could be clarified. Furthermore, one of my major concerns has been cleared up, see my point (1) below.

Maybe some points in my review were misleading, so please let me comment on this.

(1) Please, do not let us argue about the necessity of tuning convection parameterisations in a climate model in general. Yes, I am aware that not mass fluxes have to be tuned (I did not ask for that) but TOA radiative fluxes and the hydrological cycle. From reading Tost et al. (2006) I got the impression that this was not done. From the authors' reply I read that this HAS been done. So, this is important new information and I'm grateful that the authors addressed this "severe" point.

(2) Regarding your comment (first sentence on S2880): I did not ask for an "unexplained" adjustment factor. If the authors derive new correlation parameters a-e for A_updr in E5/M1, this is important information that has to be given in a table, like Allen and Pickering (2002) gave their values for GEOS DAS.

(3) "We do not agree that the application of a mass flux parameterisation to different convection schemes is not valid." This is not what I said. A mass flux parameterisation can be applied to different convection schemes (there is one exception, see my point (4) below), but it has to be adjusted: again, the coefficients a-e in A_updr reflect the correlation between the observed flash rate and the mass fluxes from the RAS convection scheme in GEOS DAS. Using different mass fluxes as input for A_updr will most likely result in a different correlation. This has to be checked.

(4) Sorry, maybe my term "frequency distribution" was misleading. I did not ask for "frequency spectra" as the authors explain it. I would like to see simple histograms of the grid box mean values for the mean mass flux within a cloud for convective events over land and sea. I.e. how often do strong mass fluxes occur over land and over the ocean? Yes, I am aware that this problem results from the convection schemes. That is exactly my point. If a convection scheme produces the same strong mass fluxes over sea and over land, then the prerequisite for the applicability of A_updr is simply not given for this specific convection scheme.

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Interactive Comment