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Interactive comment on “Lightning and convection parameterisations – uncertainties in global modelling” by H. Tost et al.

Anonymous Referee #2

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General Comments:

This is a very interesting paper that compares different convective cloud schemes with different lightning parameterisations in global climate models. The paper is well written, clear, with figures that support the analysis and conclusions. I think the paper will be ready for publication after a few minor revisions.

Specific Comments:

P6774, line 7-8: It is not clear what is meant by the "daily climatologies" from LIS and OTD. These satellites are polar orbiters and therefore do not obtain daily data, but rather snapshots on different days at different locations around the globe. The daily climatologies can only be established after about 55 days of observations in order to

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get enough temporal coverage of the globe. So you need to explain what you mean by daily climatologies, since for 1999 you do not have daily lightning maps.

P6779, line 5: Are the observed cloud heights from ALL clouds (including cirrus) or only deep convective clouds? Are the heights derived by radar reflectivity or IR imagery? There is a difference between radar heights and IR heights. This needs to be addressed.

P6783, line 14: How are the NO_x profiles determined? All lightning parameterizations only give flash frequency, with no vertical distribution of height. If you use the Price and Rind (1993) IC/CG ratio, this still gives no real vertical distribution. CG flashes can occur below and within clouds. So you need to explain how the lightning was apportioned with altitude. Furthermore, there is no comment on the conversion factor from lightning to NO_x (used in Fig. 7). This conversion is not trivial, and needs to be addressed in the paper.

P6786, line 9: typo "this may be"

P6787, line 5: "in addition to the resolution dependent" Line 7: "combinations is it possible.." Line 8: The lightning observations themselves have problems (diurnal sampling, 90sec observation of storms, optical sensor biased to IC flashes, grouping of flashes, etc.) and therefore there are also uncertainties in the observations that should be mentioned. The observations are the best we have, but not necessarily the truth. Line 11: P_{cth} is related to cloud top height, which is directly linked to updraft velocity, which is linked to electrification and lightning. Hence there is an indirect physical explanation as to why cth is related to lightning.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 6767, 2007.

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