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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On interpreting studies of tracer transport by deep cumulus convection and its effects on atmospheric chemistry" *by* M. G. Lawrence and M. Salzmann

Anonymous Referee #1

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This manuscript addresses the fact that deep convection in global models is represented by both convective parameterizations and by the resolved circulation. Due to this circumstance, sensitivity studies for the effects of deep convection on tropospheric ozone, for example, are flawed. When the parameterized convection was turned off in such studies, all of the convective transport was not turned off due to the fact that the component that was resolved at the grid scale was still operating. These results may explain the discrepancies in the conclusions of previous such sensitivity simulations by different models. The differences could be caused by varying amounts of the total convective flux being contained in the convective parameterization.

This paper should be published in ACP with only minor edits. It is a valuable follow up to the previous literature on the effects of deep convection on tropospheric ozone. My only concerns are expressed below:

p. 12176, lines9-10: Indeed Riehl and Malkus (1958) and Folkins et al. (2008) indicate that slow vertical advection cannot account for most of the vertical mixing in the tropics. However, what is the justification for assuming values of 0 to 0.5 for flad? Please add some comments to the text in this regard.

p. 12177, lines 14-25: MATCH is used with NCEP data, which, of course, already contains the effects of the convective parameterization that was applied in the NCEP model. Has any comparison ever been done between the values of convective mass fluxes (upward and downward) generated directly in the NCEP model with those redi-agnosed from MATCH? I would suggest that there would have to be differences. How large are they? I would think that the current analysis would have been stronger with use of parameterized convective fluxes computed directly by a GCM. Some comments should be added to the text to address this issue.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 12163, 2008.

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Interactive Comment