Atmos. Chem. Phys. Discuss., 10, C8655–C8657, 2010
www.atmos-chem-phys-discuss.net/10/C8655/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Tropical deep convection and its impact on composition in global and mesoscale models – Part 1: Meteorology and comparison with observations." *by* M. R. Russo et al.

Anonymous Referee #2

Received and published: 14 October 2010

This manuscript is the first in a 2-part series (with a closely-related third paper by Hosking et al.) submitted to ACP. The series focuses on tracer transport by deep convection; this paper sets the stage by comparing the deep convection parameterization statistics for several different models with carefully-selected, well-established observations of key parameters, including precipitation, cloud height (and water vapor; see below). I find this study a useful contribution to our understanding of the current state of global model simulations of deep convection, and important as a basis for Part 2 (which is the real objective of the SCOUT-O3 model intercomparison, and the two parts definitely

warrant separate publications due to differences in focus and audience). I recommend publication in ACP after some modifications. The other referee has already provided extensive comments, in particular for extending the analysis on several points. Although I think some of those suggestions are more matters of taste than specific requirements, most of the recommendations would help to strengthen the paper. Since the list of suggestions by the other referee is already fairly exhaustive, I will only add or emphasize a few specific points which I think are most important.

1) First, I would like to commend the authors on their choices of data for comparison with the models. They have basically covered the bases in terms of well-established datasets of satellite observations for convection-related parameters. The fact that more than one dataset is used for each parameter makes the study far more robust than if only one had been chosen, and I do not think that additional datasets are really necessary, with the exception of one (radiosonde water vapor, see the next comment).

2) No analysis is included of simulated water vapor compared to the observations. This is conspicuous and critical, and has also been pointed out by the other referee. It should definitely be included, both in terms of the seasonal cycle (like Fig. 3), as well as the geographical distribution (like Figs 4 or 5-6). Because this is a particularly difficult parameter for satellites (seen nicely in the differences between the blue lines in Fig. 2), I would suggest adding water vapor data from radiosondes to the analysis to make this part more solid. (There is a statement in the text about water vapor and OLR not being easily available from CTMs; I definitely understand this for OLR, but not for water vapor, since it is an integral part of all CTMs I am aware of - it is needed not only for clouds, but also e.g. for OH formation).

3) Generally the text-to-figure ratio is somewhat high for my tastes - I think the flow of the paper would benefit from additional figures giving the reader a broader overall impression, combined with somewhat less description of the details (letting the reader ponder over the figures more to see the specific differences), but keeping the nice overall conclusions in the analysis of most of the figures that are present. Adding a

section on water vapor with several figures would already help this, and some of the comments from the other referee may help with this as well.

4) P 19472 L 1: Hosking et al. (2010) should also be cited here in this context

5) P 19473 L 2: add *nearly* to "all types of...models", since there are some Lagrangian particle dispersion models (e.g., FLEXPART) for which only some versions - but not all those that are in common use - include a convection parameterization.

6) P 19474 L 11: briefly distinguish the two rounds of model simulations here (pointing to Hoyle et al. for more detail).

7) P 19475 L 18: both "convective parameterisation" and "convection parameterisation" are used in the manuscript. The latter is correct and should be used throughout (the parameterisation code itself is not convective, rather it is a parameterisation of convection).

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 19469, 2010.