Atmos. Chem. Phys. Discuss., 10, C5561–C5563, 2010
www.atmos-chem-phys-discuss.net/10/C5561/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "A model study on the influence of overshooting convection on TTL water vapour" *by* M. E. E. Hassim and T. P. Lane

Anonymous Referee #1

Received and published: 20 July 2010

Review of the paper "A model study on the influence of overshooting convection on TTL water vapour" by Hassim and Lane.

General Comments

This paper uses the Weather Research and forecasting (WRF) model to simulate the 3d evolution of two convective clouds with overshooting convection, initialized with sub-saturated and supersaturated conditions. The simulations quantify how moisture fields are perturbed outside of the cloud in the upper troposphere and lower stratosphere. The results definitely add to previous published results. The calculations are of large interest due to the thoroughness of the calculations and should be published.

The paper is very well written. My comments for improvements are very minor.

Overall, a very nice paper!

Specific Comments

Page 12, line 275 Since sedimentation is dependent upon particle size, and the removal of ice is removed mostly through sedimentation, what are typical ice radii that are predicted by the model? Are these radii realistic? I do note that on page 16, line 387 that the 'vapour-scavenging' and 'vapour-enrichment' effects are insensitive to variations to fallout velocity. What change in particle radius corresponds to a doubling of the fallout velocity?

Page 18, line 429 What is the total volume of cloud mass that is irreversibly injected into the stratosphere from the TTL for the two cases?

Technical Corrections

Page 6, line 112. Revise the phrase "did not cater" with a phrase that is more easily understandable.

Page 7, line 142 Page 8, line 1 Revise the phrase "with a difference of almost 40% (100 +- 20%)" in expanded form. I am not sure what is meant by the current text.

Page 9, line 177 Give units for IHGT and IQV.

Page 10, lines 213-222 I needed to read this paragraph twice to understand it. One line 215 the perturbation should be -15 km. It may be helpful to indicate on line 218 the x and y range of the outer shell, and on line 220 the x and y range adjacent to the cloud core.

Page 12, line 263 Change to "accounted for by an increase in water vapour"

Page 14, line 325 Indicate verbally why TKE of 0.05 m2 s-2 is chosen (i.e. identify what physical threshold this TKE represents).

Page 18, lines 433-434 Indicate the x and z range (and/or the color in the Figure) of

the plume of ice and water in the text.

Page 19, line 462 Revise to “perturbations in the right portion of Fig. 12f”

Figure 2 caption Indicate in the caption text that the levels of netural buoyancy heights are 16.5 and 16.0 km for panels (a) and (b).

Figure 4 and 5 captions Indicate in the caption text that the 0.01 g kg-1 contour marks the cloud boundary.

Figure 10 caption. Indicate what physical threshold is represented by the 0.05 m2 s-2 TKE value.

Figure 11 caption Mention in the text that potential temperature values are contoured in steps of 10K.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 16969, 2010.