Atmos. Chem. Phys. Discuss., 9, C3104–C3106, 2009
www.atmos-chem-phys-discuss.net/9/C3104/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Regional modelling of tracer transport by tropical convection – Part 1: Sensitivity to convection parameterization" *by* J. Arteta et al.

J. Arteta

joaquim.arteta@cnrs-orleans.fr

Received and published: 21 July 2009

You pointed out the lack of a single core argument /strong conclusion in the paper. This is in agreement with the other referee's review. This general remark has been taken into account in the revised version, in particular by providing more quantitative results for TRMM comparison (see details below) and a more focused discussion.

Comparison with TRMM rainfall rates: As you suggested, a more objective comparison of the model with TRMM rainfall has been done. We now use common measures for the precipitation forecast accuracy: the equitable threat score, the probability of detection and the false alarm ratio We have plotted the daily evolution of these measures

(see Figure 5 in the revised version) and of the accumulated rainfall rates from both the model and TRMM to characterise the model behaviour as a function of time (see Figure 2 in the revised version). To evaluate quantitatively the monthly mean rainrate, we added a distribution plot of TRMM rainrates versus model (see Figure 4 in the revised version) in order to highlight strength and weakness of each closure for different rainrate regimes. These new results show that the different closures clearly provide results that can be sorted into two different groups (AS, KF and EN (group 1) and GR, LO and MC (group 2)). All of the closures model fairly well rainrates both on a daily and a monthly basis. They show small differences when the convective activity is weak and larger for active periods. The news material provided in the revised version clearly shows that the 6 closures provide similar convection triggering times and locations. The two groups mainly differ in the amount of total and convective (=produced by the convection parameterization) precipitation as shown by Figure 9. All these results are discussed in sections 3.1 and 3.4. Radiosonde comparisons: We agree that the radiosounding comparison should be completed by a statistical basis. We have added a table in the revised version giving the statistical results (mean bias and standard deviation for temperature, wind speed and direction and specific humidity) for the two radiosounding stations (Manus and Darwin). It shows that for both stations, the differences between one closure/parameterization to another are much lower than the differences between the model and the measurements.

Page 5904 line 19: from the new TRMM results it is now possible to show quantitatively that the Group 1 (EN, AS and KF) closures/parameterizations gives the best results.

Top page 5897, line3: This sentence was not clear. For each closure the same conceptual model is used; namely, the cloud consists of two steady state circulations caused by an updraft and a downdraft. The text is changed in the revised version in order to make this point clearer.

Page 5899, line 18: In the paper the stratiform precipitation refered to the precipitation not provided by the convection parameterization but by the microphysical parameteri-

ACPD

9, C3104–C3106, 2009

zation. This part has been revised to make things clearer and additional material has been included and discussed: Figure 9 which shows the total and convective (=provided by the convection parameterization) precipitation. For Group 2 (GR, MC and LO), only 45% of the total precipitation is provided by convection parameterization while for the other group it is about 77%. This is discussed in the revised version.

Page 5902, line 16 : All the non local flights that are within the simulation domain (23rd , 25th, 29th November) have now been used to calculate statistics provided in Table 3 (revised manuscript). The other SCOUT-O3 flights have not been used due to their low extent around Hector event, not in accordance with the model horizontal resolution. As for radiosounding statistical analysis, results for these flights show a good agreement between measurements and the 6 closures/parameterizations. Differences between on closure/parameterization to another are smaller than the differences between the model and the measurements.

CNRS-INSU is the organisation to which the Laboratoire de Physique et Chimie de l'Environnement et de l'Espace belongs to. There is an agreement between CNRS-INSU and EGU and we guess that this is the reason why the logo appears. We cannot do anything about it.

New figures are available in the attached supplement zip file.

Please also note the Supplement to this comment.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 5889, 2009.