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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A compressed super-parameterization: test of NAM-SCA under single-column GCM configurations" *by* J.-I. Yano et al.

Anonymous Referee #1

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Interactive Discussion
Discussion Paper

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Interactive Comment

Review of "A Compressed Super-Parameterization: Test of NAM-SCA under Single-Column GCM Configurations."

14 December 2012

General Comments

This paper describes how NAM-SCA has been used in two SCM models and stand-alone SCM designed to run with NAM-SCA for two well known SCM cases GATE and TWP-ICE. Using the NAM-SCA to replace parametrizations inside a model is new and is presented as an alternative to super-parametrization. The paper lacks sufficient description or references to the SCM models being used, particularly their physics. The differences between the two chosen SCM cases is clearly described. There are a lot of results presented particularly for the NAM-SCA tests. Intercomparison of the results for precipitation is not helped by the plots all having different ranges on the mm/h axes for e.g. the GATE case. The same is true for all the domain versus dx plots. The result of most general interest to modellers is that simulating mesoscale organisation e.g. squall lines in the NAM-SCA does not ensure a better simulation of heating and moistening tendencies, conventional parametrization schemes can do just

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as well.

Specific Comments

1. Introduction

No references to a description of the physics of either the ECHAM or the ACCESS model. If none are available for the particular model version being used then some description should be provided in the paper as results are shown from simulations using the model physics. What sort of convection scheme, large-scale micro-physics and cloud schemes are being replaced by NAM-SCA?

In the case of the simulations with the NAM-SCA it would be useful to see exactly what "physics" is left in each of the SCM i.e. how do the ECHAM, ACCESS and stand alone SCM models really differ. Is it in the remaining physics or is it in the vertical/time resolution? A table giving details may help. Do the SCM being used make any assumptions about their grid-box size? If so how does this compare with the various domain sizes being used when running NAM-SCA?

2. Formulation of the problem

2.2 Cloud fraction & radiation

Is the cloud fraction information being provided to the SCM model radiation scheme from NAM-SCA consistent with what the SCM would have received with its own physics or is it a different form of information? Some models have complex cloud information being passed to their radiation schemes and distinguish between water and ice cloud.

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4.Results

4.1 Results with default GCM-SCMs

Section 2.3 says the rms errors for precipitation will be evaluated using the instantaneous precipitation from the SCM but section 4.1 then plots hourly or 3 hourly mean precipitation from ECHAM but instantaneous precipitation from ACCESS. It would be better if a consistent approach to plotting the data were taken. It would also be useful to know the rms errors if using 3 hour mean precipitation instead of instantaneous data.

4.3.1

Another reason why the NAM-SCA may fail to do as well for the TWP-ICE case is that the ice micro-physics is important (Varble et al 2011) and the NAM-SCA does not include this.

4.5

It is interesting that the stand-alone results for NAM-SCA, a setup designed to work with the NAM-SCA, fails to improve on the ECHAM SCM as far as prediction errors are concerned.

Technical corrections

1. Page 28253 Last sentence in 1st paragraph should have a “the” before the last word integral.

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2. Page 28271 line 19 there is a space in GATE in the text which needs to be removed.

3. Fig 3 - small unexplained numbers (50 8 1) on the top of the plots.

4. The text and numbers on the axes of all the Q1 and Q2 figures are small and difficult to read.

5. Figure 18 & 21 very small text stuck at the top of (a) and (c)

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