

## ***Interactive comment on “Prognostic precipitation with three liquid water classes in the ECHAM5-HAM GCM” by V. Sant et al.***

### **Anonymous Referee #2**

Received and published: 29 March 2015

#### Major comments

Page 7784, line 16. Run the model long enough or, better yet nudge winds to a common analysis, to improve statistical significance.

Since the aerosol optical depth is changed significantly, this could affect the aerosol radiative forcing ERF<sub>ari</sub>. Please add a diagnostic radiation calculation without aerosol to partition the ERF into ERF<sub>ari</sub> and ERF<sub>aci</sub> (e.g., Ghan, 2013).

The manuscript has far too many problems with the English for a reviewer to identify and suggest all corrections. I've identified twelve corrections and improvements for the only the first two pages. If the corresponding author cannot improve the English in the rest of the manuscript, the coauthors should get more involved.

C1173

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



More clarity is needed in several places, including whether all microphysical modes contribute to cloud optical properties, and how those optical properties are represented.

### Minor Comments

Page 7784, first sentence. I recommend reordering this sentence so the dependent phrase follows the main part of the sentence.

Page 7784, line 5. Insert comma after and.

Page 7784, line 8. Replace “phase” with “phases”. Replace “the prognostic” with “a prognostic”.

Page 7784, line 10. Remove “does”.

Page 7784, line 24. Remove “the” after “towards”.

Page 7785, line 6. Replace “may” with “whether”.

Page 7785, line 18. Replace “in cloud droplets” with “in the number and reduction in size of cloud droplets”.

Page 7785, line 19. Replace “cloud” with “in warm clouds”.

Page 7785, line 20. Remove “upon”.

Page 7785, line 21. Insert “produces” before “a significant”.

Page 7785, line 22. Remove “is produced”.

Page 7785, line 28. Start new sentence at “thus”. Start new paragraph that focuses on mixed phase clouds.

Page 7788, line 15. Citing Ghan and Easter, Mon. Wea. Rev. (1992) would be useful here.

Page 7790, line 20 - Page 7791, line 12. While the distinction between cloud water,

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



drizzle and rain has a basis in physical processes, the distinction is much less clear for frozen water (Morrison and Grabowski, JAS, 2008). This issue should be discussed here.

Page 7794, lines 19-20. Insert “the computational cost” “ after “reduces” and make clear how much of the model this refers to (collection, the whole atmosphere, the coupled system).

Page 7796, line 11. What does “large” mean? Significant (statistically)? If so, demonstrate it. Or just noticeable? Do these paths include drizzling and precipitating particles as well as cloud particles?

Page 7797, line 1. Is the hydrologic cycle faster if the precipitation rate and total water path don’t change? Since you’re discussing condensed water, not total water, I would say the cloud lifetime is lower.

Page 7797, line 3. How do you know the differences are significant?

Page 7797, line 10. How does cloud lifetime affect SWCRE? Do you mean cloud fraction?

Page 7797, lines 17-19. Does your model treat the contributions of drizzling and precipitating particles to cloud optical depth? It was found to be important in CAM5. You should describe how the optical properties are determined. Are the same shapes assumed for all frozen modes?

Section 3.2.2. Do the ice and liquid water contents include contributions from the drizzling and precipitating modes?

Page 7802, lines 3-21. Further discussion of Morrison and Grabowski (2008) would be useful here.

Figure 13. Please show standard error about the mean values.

Page 7806, lines 16-24. This might be a place to mention Morrison and Grabowski

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



again.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 7783, 2015.

**ACPD**

15, C1173–C1176, 2015

---

Interactive  
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

C1176

