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Discussions

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Interactive comment on "Why do GCMs overestimate the aerosol cloud lifetime effect? A comparison of CAM5 and a CRM" *by* Cheng Zhou and Joyce E. Penner

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This manuscript presents a clear comparison between two very different models driven by the same boundary conditions but yielding very different results. The analysis clearly reveals the causes of the differences. The work has important implications for global estimates of aerosol effects on clouds.

Lines 29-30. The word "show" is used twice in this sentence. I suggest instead "Observations of ship tracks show that the liquid water path (LWP) in marine boundary-layer clouds can either increase or decrease with increasing aerosol particles . . ."

Page 3. It's worth describing the subgrid treatment of cloud microphysics in CAM5:

size distribution and subgrid variability.

Page 4. Does the GCE also use saturation adjustment? How does the dependence of autoconversion on droplet number compare with the KK scheme?

Page 6, line 19. Start new paragraph here.

Page 6, line 30. Start new paragraph here.

Page 7, second paragraph. Please make clear which model is being discussed.

Page 8, lines 22-24. "This is likely due to the fact that the two models use different cloud droplet activation schemes as well as schemes to parameterize the autoconversion and accretion processes" Please demonstrate this with offline results.

Page 9, line 21. Insert "horizontal" before "grid".

Page 11, line 3. New paragraph.

Page 11, lines 10-13. I believe Chris Bretherton tried to implement a treatment of this mechanism in CAM but did not get the desired result. The code for that mechanism might even be in CAM5. I recommend contacting him about that.