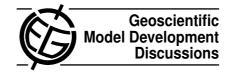
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5, C470-C472, 2012

Interactive Comment

Interactive comment on "Unified parameterization of the planetary boundary layer and shallow convection with a higher-order turbulence closure in the community atmosphere model: single column experiments" by P. A. Bogenschutz et al.

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This manuscript describes encouraging results from application of an advanced turbulence/subgrid microphysics scheme to a widely used community atmosphere model. The scheme simulates boundary layer clouds with much less sensitivity to vertical or temporal resolution and more realistically than the boundary layer cloud schemes in a community atmosphere model. This improvement is related to the unified treatment of stratiform and shallow cumulus clouds.

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The presentation is clear and balanced, and the selection of figures is parsimonious and effective.

- 1. Page 1746, line 10. Insert "consistently with the PDF of total water" after "ratio".
- 2. Page 1746, line 18. Insert "to" before "predict".
- 3. Page 1746, line 24. Replace "includes" with "includes".
- 4. Page 1746, line 26 and page 1747, line 21. Change "2011" to "2012".
- 5. Page 1748, line 7. Can you provide a reference for a ""incomplete" predictive third-order turbulence closure" scheme?
- 6. Page 1748, lines 24-27. It is worth mentioning here that aerosol activation should be integrating over the pdf of w (Ghan et al., JGR 1997). Calculation at a single updraft velocity is done only for computation expedience, and is an approximation that is questionable if the pdf of w is skewed.
- 7. Page 1749, line 3. Change "advantage" to plural form.
- 8. Page 1752, line 3. Replace "relatively little" with "much less".
- 9. Page 1753, lines 13-16. How do droplet number concentrations estimated by CLUBB with single and pdf of w compare? Now that we have a scheme that can produce skewed distributions of w, we should start integrating activation over the pdf of w. The activation scheme is coded for it, and I have an approximation to the Abdul-Razzak scheme that calculates activation 10 times faster. Please contact me for the code.
- 10. Page 1753, line 26. Insert "the" before "CAM-BASE".
- 11. Page 1757, lines 20-25. You might note here that the CAM-BASE simulations seem to be less sensitive to vertical resolution than the CAM-CLUBB simultations.
- 12. Figure 9. Label says 30L and 240L, not 30L and 60L.

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- 13. Page 1757, line 26 page 1758, line 6. Again, integrate activation over the pdf(w) with CLUBB.
- 14. Page 1758, lines 14-24. Could you comment on the strong $2\Delta t$ oscillations in simulations at 1800 s time step? Are they also present for 60 s?

Steve Ghan

Interactive comment on Geosci. Model Dev. Discuss., 5, 1743, 2012.

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