

Interactive comment on “Microphysical controls on the stratocumulus topped boundary-layer structure during VOCALS-REx” by I. A. Boutle and S. J. Abel

Anonymous Referee #1

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Review of “Microphysical controls on the stratocumulus topped boundary-layer structure during VOCALS-REx” by Boutle and Abel

The objective of this work is to better understand the influence of the microphysics on the representation of the cloudy atmospheric boundary layer in a numerical model. They build on reasoning from previous work (e.g., Abel et al. 2010), which motivates their research question. It is clearly written and structured and provides a link between drizzle and its feedback into the boundary layer structure within the context of the parameterization scheme. I recommend it is accepted, but raise a few minor issues.

General Comment:

C46

The authors have done a good job identifying how the overproduction of drizzle changes the boundary layer structure and how reducing the amount of drizzle can improve the representation of the lower atmosphere. It may be worth commenting that when the parameterizations are changed within a model to improve a certain aspect of the simulation, this may have negative impacts on other aspects of the simulation (e.g., better boundary layer structure but worse precipitation from tropical convection). I understand that the point of the article is a specific aspect, so just a sentence would be good enough.

Specific Comments:

526, line 7-10: I think it would be helpful to the reader to expand and be bit more specific regarding “changes to the microphysics scheme” to say exactly what changes are made. I think it could be done succinctly so as not to take up too much space in the abstract.

527, line 13-14: I understand why you put it there, but to me the justification of whether or not to grit roads in winter seems a little out of place for a case study of the marine boundary layer over the subtropical southeast Pacific Ocean.

528, line 4: Again, it would help to state directly what simple change was made to the microphysics schemes instead of requiring the reader to refer back to the original paper.

529, line 4: I think here is where the abbreviation GA3.0 should be introduced, which is used below.

529, line 11: Is there really a big difference in the large-scale meteorology if the model is not re-initialized? I do not think that there would be much of a difference in the synoptic forecast with just a one day difference. If there is indeed a notable difference in the output regarding the boundary layer, I would attribute it to other factors and not changes in the large-scale conditions.

C47

533, lines 3-14: Along with my general comment, here is an example where one part improves (cloud amount better at night) at the cost of the other ('LWP and cloud cover during the daytime are now too high').

534, line 14: Is there a reference for PC2?

536, line 14: Here it is acknowledged that resolution does help with representing some aspects. I suggest that this is also mentioned elsewhere to qualify the statements that resolution is not important.

544, line 6: Is it known if the biggest difference is in the microphysics or perhaps boundary layer scheme in WRF? If so, it would be useful guidance to WRF users who want to better model the stratocumulus-topped MBL.

544, line 23: Once again, I think it would be good to just say what the simple improvements are specifically since that is really the key finding and belongs in the conclusions.

Figure 2: I have a hard time seeing the blue line when it passes through the dark shading in the bottom part of this figure.

Fig.7 caption: The caption refers to top/bottom when it should be left/right. Is the figure meant to be tiled vertically instead of horizontally in the final version?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 525, 2012.