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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Marine boundary layer over the subtropical southeast Pacific during VOCALS-REx – Part 2: Synoptic variability" *by* D. A. Rahn and R. D. Garreaud

Anonymous Referee #2

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General comments

This is a very nice and well-written regional modeling study of how the passage of a midlatitude cyclone affects the MBL depth across the southeast Pacific (SEP) stratocumulus region. The conclusion that it is principally horizontal advection of inversion height that drives the MBL depth variability is elegantly demonstrated. Similar dynamics affect other subtropical stratocumulus regions (e.g. the study of Stevens et al. 2007 MWR in the NE Pacific), so this paper should be of interest to a broader group of ACP readers as well as those specifically interpreting observations and other model simulations of the SEP.

G1: To complement Part I, it would be appropriate to remove the diurnal cycle from the variability under consideration here. This is likely most important near the coast and north of 25 S. Rather than using a 9-point smoother, this suggests the authors should use daily average statistics (or an 8-point running mean) to compute the standard deviations of omega, MBL height, etc. Alternatively, they should explicitly show that the 9-point smoother already removes the diurnal cycle adequately.

Specific comments

S1: 26069 line 11: 'there is no systematic bias...' - please reword or clarify, since you go on to note a large systematic bias in simulated MBL height, and have previously said that there is less correlation between observations and simulations during the November period.

26071 line 7: What is the second of the 'two important differences' alluded to here?

26071 line 8: The MBL depth and surface pressure don't have the same units, so one shouldn't say that one has larger variation. What I think you mean is that unlike SLP, the MBL depth variation at a given latitude south of 30 S increases near the coast compared to at 85W.

26071 lines 13-15: In light of your arguments about horizontal advection of MBL depth, can you explain why the coastal zone from 15-25 S has reduced MBL depth variability, despite being downstream from a region of very strong MBL depth variability to the south?

26076 line 1: Do you understand why there is also a deep MBL north of the cold front on the Oct 10 panel of Fig. 13? Is this also advectively driven?

26076 line 3: On the OCt 12 panel of Fig. 13, I see a southeasterly wind at 20S 85W and SSW flow only south of 25S.

Technical corrections

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T1: 26071 line 29: ’Mass balance’ might be more appropriate than ’force balance’.

T2: 26073 line 21: The slope of 0.4 should be unitless.

T3: 26074 line 25: Add ’depth’ after ’MBL’.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 26063, 2009.

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Interactive Comment