

Interactive comment on “A regional real-time forecast of marine boundary layers during VOCALS-Rex” by S. Wang et al.

Anonymous Referee #2

Received and published: 27 September 2010

This paper evaluates the COAMPS model in simulating the marine boundary layer during VOCALS-REx period. The authors compare the model with a wide range of observations and consider the impact of model resolution on the simulations. This is an interesting paper and provides a useful understanding of the performance of the COAMPS model in this region. The writing is clear and the overall presentation is good. I recommend acceptance with minor revision. I have a number of minor comments, corrections, and suggested improvements below.

Is there any cloud fraction/partial cloudiness scheme used in COAMPS for the computation of radiative fluxes? It's not clear from the text.

How strongly is the diurnal cycle that you present influenced by the grid-cell convection events? Is the diurnal cycle during periods without grid-cell convection similar to the

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overall mean diurnal cycle?

After Figure 5 are you still using results from the 15km mesh for most of the rest of the paper? It's not clear from the text.

p. 18428: Lines 12-14: It appears from the Figures 4e and 4f that much of the time and much of the 15km domain (say from 10S to 25S, east of 85), the time of the LWP maximum is on average 4 hours earlier for the model than for the satellite, consistent with Figure 14.

p.18428: Line 28: A significant part of the coast between 25S and 17S, model wind speeds are maximum in the late morning.

p. 18432: Line 26-7: Why does the low zi imply lower qc values? Is the cloud thinner? Or is there lower cloud fraction? Or both?

p. 18433: Line 16: A suggestion: could you quantify the difference in LW cooling? Similarly in section 7, p. 18441 Line 12 could you quantify the radiative cooling for different resolutions?

p. 18433: Line 25: Would be clearer as something like “The weak sub-cloud TKE...”

p. 18436: Lines 17-18: You could mention that increasing qv10m trend here is associated with the increasing SST.

p. 18437: Line 14: It may help the reader here if you describe the plot with ‘The “thick cloud” condition (blue points) is defined here...’ and ‘the “clouds free” condition (green points) is defined...’.

p. 18440: Line 22: You should say ‘(not shown)’ for horizontal theta advection. It would be nice to include a plot of this if you have space.

p. 18442: Lines 25-29: Isn't some of the MBL deepening due to increasing SST offshore?

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p. 18442 Line 7: It sounds a little imprecise to describe the satellites as 'operating in the region'.

Table 1: Table caption or column heading should mention that LW and SW are downward. v bias should be 1.00

Figure 3: latitude and longitude labels are not consistent between left and right panels.

Figure 7. Latitude of each row should be more prominently labeled or the rows could be labeled 'offshore', 'midway', and 'near shore'. Also the 'Composite COAMPS and RHB soundings' appears misplaced.

Figure 9a: The cloud liquid water contour labels are small and hard to read because of the other lines. The 'C-130 Zi' labeling runs into the left edge of the frame.

Figure 12: It would help if the caption mentioned that this is at 20S.

Figure 17: The caption should mention that the horizontal grid resolution varies from left to right.

Typos, grammar etc:

p.18422 Line 15: should be 'studies have focused...'. p.18425 Line 9: should be 'consist of a 10-min synthesis data set'. p. 18428: Line 24: It may be clearer to say 'maximum jet wind speed is small.'. p. 18431, Line 21 and p.18440, Line 26: "It is also noticed" would probably be better as "It should also be noticed". p. 18435: Line 8: should be '... and biases in u and v are less than 1 m s⁻¹'. p. 18440: Line 12: if you say 'finest grid mesh' instead of '3rd grid mesh' it would be more clear. p. 18443: Line 24: hyphen not needed 'higher resolutions'. p. 18443: Line 25: Sentence could start 'Simulations with the 5-km grid mesh predicted...' since the mesh doesn't 'predict'.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 18419, 2010.