

Interactive comment on “Evaluating transport in the WRF model along the California coast” by C. Yver et al.

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Answer to Reviewer #1

Thanks to the reviewer for his helpful comments.

We have modified the figures to get as much information as possible without compromising the comprehension. For some, simulations have been removed and for most errors have been added. The blue and brown zones in the wind direction as well as the vertical dashed lines have been deleted. To assess the shorter term variability of the data, a comparison using the METAR surface weather station data and the model in its 2 hour output has been done and the domain-wide RMSE computed. Surface data have also been revised using the METAR surface data. Details and results are added

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in the text.

Introduction: Recent literature has been added to the introduction.

Section 2.1 line 70: The NAM dataset uses 27 levels in the vertical while the Era-interim dataset uses 38 pressure levels in the vertical. The compression ratio is then 0.96 for NAM and 1.36 for ERA-interim. 28 levels was the default value in WRF and as it was close to the number of levels in NAM, we kept it unchanged. We did some testing using 40 and 60 levels. No change in the heights of the low levels and no improvements in the winds and temperature were observed.

Section 2.2, line 90: This part was reformulated to “ Over the ocean, the PBL diurnal cycle is weaker, nonexistent or reversed.” line 103: The reference was corrected. line 108: This was corrected.

Section 2.4, 2nd paragraph: the paragraph was reformulated to “ The first meteorological dataset is a forecast product and comes from the National Centers for Environmental Prediction (NCEP) North American Model (NAM) with a 12 km and 6 hour resolution. . . . The second meteorological dataset comes from the European Center for Medium Range Weather Forecasts (ECMWF) and is the ECMWF Re-Analysis (ERA-interim) (with observation assimilation) with a 80 km and 6 hour resolution”

Section 3.1: Details about the ACARS data and the statistics of the sampling were added. Moreover, we have revised the paper to use the METAR surface data for the surface comparison. A comparison with the lower vertical level for the profiles has been done and show good agreement between the datasets.

Line 205: For all the graphics, time was changed to Pacific standard time (UTC-8).

Line 226: The quartiles around the median calculated for the ensemble of the simulation were added on the graphics to represent the day-to-day variations. In case of a very different simulation or when the figure was still easily readable, the quartiles of separate simulations have also been added. The diurnal cycle for the level above the

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surface was calculated but the sea breeze was not at all improved for the month of august. As stated in the text, all schemes are always missing the sea breeze except for the TEMF scheme, where the sea breeze is apparent for the lower quartile.

Line 243: This part was reformulated to be clearer and encompass the information from the variations in the simulations.

Line 300: In WRF tutorial classes that the author followed, an odd factor was recommended to be consistent with the grid but not specifically 3. The smaller grid size was recommended to be at least 100, which was why this number was chosen. We chose a factor of 5 for convenience and avoid to have a grid size of 1.66666 km. We are specifically looking only at the center of the nest and not at the boundaries so the conclusions should still be valid. We are aware of the constraints of the size on the model physics, however, going from 0.8 to 1.666km would most probably not diminish these constraints.

Section 4.4: Figure 7 was changed to keep only one WRF simulation result as a warning.

Line 366: The explanation was clarified.

Line 396-401: A table of pressure was added for clarity.

Line 402: When using Lagrangian trajectory analysis, depending on the input data, results are different and contradictory. In some cases, the air is clearly recirculation while in others, it just comes from inland. To try to show a clearer picture, we have zoomed on San Diego and Los Angeles to better see the wind direction.

Line 408: The Santa Ana section has been revised using the METAR surface data and the results modified accordingly.

Line 409 and 411: The term “elevated” was changed to the term “stronger”.

Line 414: METAR data for the airport have been downloaded and used for the analyzes

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using surface data. The results have been modified accordingly.

Answer to reviewer #2:

We thank the reviewer for the helpful comments. As for reviewer #1, one concern was the lack of short term variation analysis. Also, the few number of stations was pointed out. To complete our study, we have added the computation of the domain-wide RMSE for the wind speed, wind direction and temperature using the METAR surface weather stations. The details and results are added in the text. The typos have been corrected.

P16852, I10 We have reformulated for more clarity. We use one-way nesting to compare two different resolutions.

P16855, I15 We have chosen WSM-3 class microphysics as a compromise between complexity and computational cost. As California coast does not encounter snow events, we have decided that a more complex scheme was not necessary.

P16856, I25 The sentence was reformulated to “Typically, nesting increases the resolution in a limited area around the measurement sites, which can provide a better simulation of the winds as well as other parameters such as temperature or PBL height near the measurement sites.”

P16858, I13 Timestep was replaced by time interval.

P16858, I14-15 We have changed the sentence to “ we used the WRF chemistry module”.

Section 3.3. CARB provides us with a single factor for California, which was applied to all basins. The paragraph has been revised for more clarity.

P16862, I22-28 This paragraph has been removed. Indeed, as we have used the METAR surface data instead of the ACARS data, there is data for the whole daily cycle even for one month. We, therefore, compare month to month data and not month to three-month average.

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Section 4.5 This section has been revised when using the surface METAR data. The conclusions are unchanged but the statements are better confirmed by the observations.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 16851, 2012.

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