Arthur et al

Evaluating mesoscale model predictions of diurnal speedup events in the Altamont Pass Wind Resource Area of California

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Introduction and recommendation

This manuscript compares simulations of atmospheric flow at a wind power production site in central California, performed with the WRF model at 1-km horizontal grid spacing and two alternative parameterizations for planetary boundary layer (PBL) turbulence. My first review of the manuscript highlighted some deficiencies in the interpretation of forecast verification statistics (systematic vs. random errors). I also recommended de-emphasizing the discussion of the differences between the two PBL schemes, which appeared to be rather marginal in practice. I am generally happy with the revisions, with the single exception of the answer to my minor comment 10, which I do not find entirely satisfactory. I appreciated the addition of Appendix A and Figures A1 and A2, which show the impact of the PBL schemes more convincingly.
I recommend acceptance, provided that lines 260-265 and 290-293 of the revised manuscript are edited as described below.

Specific (minor) comments

1. One of my comments on the first version of the manuscript (number 10) was about the negative wind speed bias at z < 30 m AGL, visible in Figure 3b. At lines 260-265 of the revised manuscript, the authors interpret the negative bias during speedup events (18-21 LST) using mass continuity arguments:

   "*Conversely, wind speeds are underestimated near the surface, indicating that the model fails to capture near-surface accelerations. ... While the model captures some negative vertical velocities at the study site during the speedup events (see contours in Figure 3f), its vertical velocities are too weak and thus do not translate to near-surface accelerations of the magnitude seen in the observations.*"

   This argument might explain why the negative bias becomes slightly larger during the evening speedup events, but not why it persists throughout the whole diurnal cycle. A remark was added in response to my comment, at lines 290-293 of the revised manuscript:

   "*This may be due to slightly improved predictions of vertical mixing of higher momentum from aloft; during this time, prior to jet development, the winds follow a standard quasi-logarithmic profile. The 3D PBL scheme has been shown previously, in idealized tests, to improve model performance during daytime convective conditions (Juliano et al., 2022)*".

   This explanation misses the point, because it refers to the small difference in bias between the two simulations with different PBL schemes; not to the bias itself, which remains quite large in both cases. A better explanation of the persistent negative wind speed bias might be that "predictions of vertical mixing of higher momentum from aloft" are quite bad even with the 3D-PBL scheme (Figure 3b), which however does a marginally better job than the competitor (Figure 4).

   The issue is not particularly relevant in the wind energy context, because the near-surface layers are essentially irrelevant for wind power harvesting. It might be important in other contexts, though.