

Interactive comment on “Simulations of a cold-air pool associated with elevated wintertime ozone in the Uintah Basin, Utah” by E. M. Neemann et al.

Anonymous Referee #2

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General Comments

The authors present a comprehensive case study that illustrates the importance of boundary layer dynamics and snow cover to the occurrence of the unusually high ozone concentrations observed occasionally in the fracking area in the Uintah Basin, Utah. Observations are compared to WRF and CMAQ model runs, and several deficiencies in the models are identified. The manuscript is comprehensive and only minor modifications are required.

Specific Comments

1. Please stick with MST throughout the manuscript; at the moment both UTC and MST are used.

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2. Stick with either a.g.l. or m.s.l. throughout; using them interchangeably is confusing. I would recommend a.g.l.

3. page 15956, Line 3: “... of the atmosphere (Fig. 1)”. Eliminate “A schematic of this...”. There are a few other places where figures can be introduced more succinctly (e.g. p.15962, Figs. 6 and 7); there is no need to duplicate any of the information that is in the caption.

4. Sixteen is a large number of figures... I think the manuscript can do without Fig. 3 (it's all explained in the text), and without Fig. 5. If you want to keep Fig. 5 in, please add a color scale, and use MST in the caption.

5. Section 3.5.1: the tilting/sloshing of the CAP is very interesting... are there any surface observations (ideally near Starvation Reservoir) to corroborate this with real data?

6. Fig. 6 can be improved by including ozone sonde profiles (if available around Feb. 4 or 5), or at least ozone profiles from CMAQ. If showing CMAQ O₃ profiles, you could also include VOC and NO_x profiles.

7. The time scale in Fig. 7, 10 and 16 is unclear. Does the tick denote the middle (noon) of the day? MST? That appears more likely than the tick denoting midnight, given the diurnal O₃ peak just after the tick. This would be rather unusual and a tick at 0:00 MST (midnight) would be preferred. Whatever you choose should be stated explicitly in the captions.

8. Instead of (or in addition to) the ozone mixing ratios being given in the little boxes in Fig. 14(a), coloring the line or boxes and providing a color code would clarify the ozone distribution on the transect.

9. I would recommend rephrasing your conclusion that CMAQ does an “adequate” job near the sources; that is a judgement call with which some may disagree. A safer statement would be to give a percent difference between model and reality.

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