

## ***Interactive comment on “Demonstration of an off-axis parabolic receiver for near-range retrieval of lidar ozone profiles” by Betsy M. Farris et al.***

### **Anonymous Referee #2**

Received and published: 9 October 2018

Review of “Demonstration of an off-axis parabolic receiver for near-range retrieval of lidar ozone profiles” by Farris et al.

General Comments: The authors report on significant upgrades to the Langley Mobile Ozone Lidar (LMOL) system, particularly the addition of a new receiver to allow the retrieval of near-surface ozone values down to 0.1 km. Comparisons with ozonesonde and POM profile measurements validate the near-field lidar measurements during the OWLETS air quality campaign in summer 2017. The paper has spelling and technical errors, but is otherwise generally well written, and the technical description of the upgraded lidar system and ozone profile validation makes this suitable for AMT. I have minor corrections and one figure suggestion to be addressed, after which I recommend publication.

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Specific Comments: Abstract: Please quote some statistics that describe the lidar comparisons with the ozonesondes and POM measurements. There is currently no description of the results in the abstract.

Figures 3 and 4: The lidar appears to have a consistent high bias compared to the ozonesondes from ~400-600 m on 2 August. Care to speculate on the causes?

Table 1: What exactly is being compared here (an average over particular altitudes)? I don't find a comparison of the average values to be very helpful and I think Table 1 should be replaced by a figure. A more useful comparison would be to take the profiles from Figure 4 and present profiles of the percentage or mixing ratio differences. The 4.43% mean difference quoted on Page 7 is made up of compensating low and high biases in the profile comparisons.

Technical Corrections: Page 1, Line 21: "can cause. . ."

Page 1, Line 22: "the elderly. . ."

Page 1, Line 23 (and other places, please review): Passive voice, suggest rewriting sentence.

Page 1, Line 26: "insights into boundary layer and free troposphere dynamics, providing a. . ."

Page 1, Line 29: "measuring ozone from the ground level to stratospheric altitudes."

Page 2, Line 11: Stick with cm, not inches.

Page 2, Lines 13-14: Suggested rewrite – ". . .LMOL instrument in a small, compact form, and, unlike traditional refractive elements, is able to simultaneously measure green and UV wavelengths more easily." Please check.

Page 2, Line 23: Need a space between "7.6" and "cm."

Figures 1 and 2: Why is Figure 2 to the left of Figure 1? Did something get switched

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around? Reverse or renumber the figures, please.

Page 3, Lines 5-6: This is not a complete sentence.

Page 3, Line 23: There seems to be a missing word here.

Page 3, Line 22: “i.e.” not “ie.”

Page 4, Line 8: Is the temperature and pressure information obtained from the radiosonde data?

Page 4, Line 30: “ozonesondes” spelled incorrectly.

Page 5, Lines 12-13: Assuming you mean Aug. 2 here, not Aug. 1. “in the early morning hours of Aug. 2...”

Page 5, Lines 14-15: Write as “. . .OAP capability illustrates that the temporal evolution of ozone can be complex, and more clearly reveals how near-surface ozone layers influence surface ozone levels.”

Page 7, Line 4: “ozonesonde” spelled incorrectly again here and on Line 15. Please check all instances.

Page 7, Line 12: Take out the ampersand and replace with “and.”

Page 8, Line 1: Leblanc does not need to be italicized.

Page 8, Line 14: Do you mean the biases between the UAV and lidar are of different sign than the ozonesonde/lidar comparisons? Please make this clear.

Page 8, Line 22: “closest in range has the greatest...”

Page 8, Line 34: “with use of a reflective focusing element” (?) Seems that there is a word missing.

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-178, 2018.

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