

The authors hypothesize that a strong low-level nighttime jet more effectively mixes down ozone into the stable nighttime boundary layer where it deposits, resulting in lower ozone the next day. On nights with a weaker jet, the residual layer remains decoupled and results in higher ozone the next day. This paper introduces methods for developing nocturnal scalar budgets from aircraft observations. This hypothesis and support from aircraft contributions is a useful contribution to our understanding of the effect of weather patterns on ozone. One general comment is that the authors could better motivate their statement that air quality models need to better forecast this feature with a brief overview of the current ability of models to simulate the nocturnal low-level jet. Generally the paper would also benefit from clearer presentation of the methodology and results including checking for consistent use of terms and figure referencing. The authors seem to discuss methodology and results intermixed in multiple locations, and a more coherent progression of methodology and results would both shorten and clarify the author's hypothesis and findings. This paper should be published in ACP after addressing these revisions and the comments below.

Specific comments:

1. Page 3, line 125. I don't understand whether the authors are using the Beaver and Palazoglu (2009) paper to support their hypothesis. They initially say that a strong nighttime LLJ reduces ozone the next day, so how does this reconcile with strong nighttime ventilation resulting in high ozone the next day?
2. Page 8, line 259. Can you comment on the validity of using 0.2 cm/s for the ozone dry deposition velocity when you argue that deposition will be enhanced when the nighttime LLJ is strong?
3. Page 14, line 376. Please discuss where the uncertainty on the 1.5 value comes from, this is unclear from the previous discussion.
4. Page 15, line 410. Do you mean the last term (not the last two)?
5. Page 15, line 423. Please use consistent language to avoid confusion. Do you mean the surplus of Ox observed on the morning flight is inferred to be driven by the "advection" term?
6. Page 16, Table 3. You haven't actually explicitly described yet as far as I can tell the procedure for calculating the storage term.
7. Page 16, line 435. Please clarify which term refers to the observed time rate of change, since no term appears to be double the sum of chemical loss and deposition.
8. Page 17, line 445. How is the error in the nocturnal PBL height included in the error analysis?
9. Page 17, line 477. It would be useful to show on the figure the extent of the SSJV and point out the nocturnal low-level jet.
10. Page 18, line 501. Give the corresponding PST, since that is what is stated in the abstract.
11. Page 18, line 504. I assume you are referring to Figures 8-9 here for the daily average synoptic charts? If so, please add this to the text.

12. Page 19, line 506. Could you again highlight this offset of the figures so that the reader can easily pick out this 100 km difference?
13. Page 19, line 510. You don't need Figure 10, just tell us the correlation coefficient and p-value.
14. Page 19, line 531. Why would higher temperatures increase photochemical production at night? What about higher temperatures increasing soil NO<sub>x</sub>? Also, you haven't mentioned PAN at all – wouldn't higher temperatures result in more PAN decomposition to increase O<sub>x</sub>?
15. Figure 11 – please explain the legend in the figure caption.
16. Page 22, line 555. Is there an explanation for the different behavior of TKE here?
17. Page 24, line 602. Can you clarify whether you are still considering a high canopy resistance in the  $v_d$  calculation?
18. Figure 16 – The font size here is difficult to read.
19. One general comment – the use of eddy diffusivity to evaluate turbulent mixing is most generally applicable to the daytime convective mixed layer. The authors could better support why this framework is applicable to the stable nocturnal boundary layer. This is better done in 3.5, so possibly referencing this section earlier on would be useful.