

Interactive comment on “Taehwa Research Forest: A receptor site for severe pollution events in Korea during 2016” by John T. Sullivan et al.

Anonymous Referee #1

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The manuscript by Sullivan et al. provides analysis on the atmospheric chemistry dataset taken during the 2016 KORUS-AQ campaign. This effort characterizes the chemical interaction between Seoul metropolitan area and its downwind region. The results confirm a VOC limited scenario for the ozone formation at the investigated area consistent with previous studies. This manuscript is well written and I recommend to publish after addressing following minor concerns.

Specific comments:

P19, the title of Figure 1, does the red square in (a) correspond to (b)? The letters in Figure 1 (c) and (d) are too small to see. I suggest to enlarge these two images. They don't have to sit inside (a) and (b).

C1

P5, section 3.1.1, the correlation between ozone and temperature in Figure 4 doesn't look significant. Previous studies [e.g., Kuang et al 2017] suggest the correlation between ozone and temperature anomaly or water vapor anomaly especially in summertime is relatively significant from surface to free troposphere reflecting the influence of meteorological conditions on ozone photochemistry. But, if meaningful average is not available, I suggest to add a relative humidity curtain in Figure 4. In addition, I don't see a sufficient analysis on the May 17 and June 9 ozonesonde profiles while ozonesonde experts are among the co-authors. Kuang, S., Newchurch, M. J., Thompson, A. M., Stauffer, R. M., Johnson, B. J., & Wang, L. (2017). Ozone variability and anomalies observed during SENEX and SEAC4RS campaigns in 2013. *Journal of Geophysical Research: Atmospheres*, 122, 11,227-11,241.

P5, L27, is the surface ozone on May 17 in Figure 1 (d) much higher than the one measured by the ozonesonde shown in Figure 4? If this is true, can you comment on this difference?

Interestingly, tropospheric ozone increased a lot from 5/17 to 5/18 shown by the ozonesondes in Figure 4.

P7, L1-2, “it encounters a rapid increase in concentrations of all species, with pronounced increases in concentrations of NO₂ (to 15-25 ppbv), CO (to 600-800 ppbv), and SO₂ (to 4-6 ppbv).” Can you provide explanation on the extremely high CO at the end of North/land Leg, >800 ppbv, in Figure 5?

P7, L26, the 2nd “6c” should be “6e”?

P24, can you label the aircraft flying direction in Figure 6?

P8, “This is a strong indicator of an aged urban air mass containing highly reactive O₃ precursors impacting rural sites.” The biggest feature in Figure 6 is the enhanced ozone at the east of TRF. Do the “highly reactive O₃ precursors” refer to VOC according to Figure 6?

C2

P10, L11, replace Figure 7 with 10.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1328>, 2019.