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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Spatiotemporal variations of air pollutants (O_3, NO_2, SO_2, CO, PM_{10}, and VOCs) with land-use types" *by* J.-M. Yoo et al.

Anonymous Referee #2

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The paper presents a detailed investigation of trace gases and PM10 variations over the South Korea using a dense observational network. These measurements classified among four land-use types are analyzed for diurnal, weekly, annual and long-term variations. Further, the observations of VOCs are utilized to investigate the ozone chemistry in the four types of land-use. Long-term systematic observations of ozone and precursors (especially inclusion of VOCs since 2007) are very important to understand the tropospheric chemistry over this region.

I provide few comments and suggestions to be addressed. Several minor corrections listed in my comments should be made before accepting the manuscript for publication.

1- Section 4, First paragraph: Authors refer to Figure 5 showing "annual" mean distri-

butions with different land use. The discussion about seasonal changes (page 16999, lines 9-13) such as intense radiation during spring and monsoon effect in summer does not fit here. It should be either moved to some relevant section (e.g. section 3) or can be removed. The discussion here should be made in context of annual average distribution shown.

2- Page 16998, line 6-8: Please explain how intense solar radiation contributes to spring maxima in PM10. Also provide adequate references here.

3- Page 17002, lines 6-7, This is unclear. Do authors suggest that biogenic VOCs over Greenbelt lead to additional ozone production? What is the relative importance of less titration against lower NOx over Greenbelt (also see Figure 13 and discussion) as compared to the role of biogenic VOCs indicated here in exhibiting higher ozone over Greenbelt?

4- Page 17003, lines 4-6. Other than comparison with a Chinese site, authors could also compare with similar secondary ozone peak in post-monsoon observed over a high altitude site in north India (Sarangi et al., 2014), similar to what is seen for Greenbelt.

5- Page 17008, line 23-25; Three regions are defined (i) Seoul (ii) SMA except Seoul (iii) outside SMA. Then authors say “Seoul was defined as part of SMA”. This is slightly unclear. Please rewrite to clarify.

6- The VOC/NO2 ratio in commerce (8.7) land use is not significantly less than threshold values (8-10). Can it be explicitly classified as VOC-limited?

Minor Comments:

1- Table 5, please correct the units by removing yr-1. These are climatological mean mixing ratios (not trends)

2- Page 16993, lines 20-25,This text is simply a repetition of the text given in Table 1. I suggest to the Table 1 for definitions instead of writing it at two places.

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3- Figure 3: use different color/ symbol for commerce and Industry. Should be kept consistent with other figures of the paper for better comparison (e.g. Figure 2).

4- Figure 6: Fonts of legends about land-use are very small. Instead of putting them in all 15 plots these could be given once in bigger fonts at the top of the figure.

5- Figure 10, caption: red square – red circle

6- Page 16998, line 27, unit of PM10: add microgram

References Sarangi, T., M. Naja, N. Ojha, R. Kumar, S. Lal, S. Venkataramani, A. Kumar, R. Sagar, and H. C. Chandola (2014), First simultaneous measurements of ozone, CO, and NOy at a high-altitude regional representative site in the central Himalayas, J. Geophys. Res. Atmos., 119, doi:10.1002/2013JD020631.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 16985, 2015.