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Interactive comment on “Variations of surface ozone at leodo Ocean Research Station in the East China Sea and influence of Asian outflows” by J. Han et al.

Anonymous Referee #1

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A review of "Variations of surface ozone at leodo Ocean Research Station in the East China Sea and influence of Asian outflows" by J. Han et al.

General comments:

This paper describes 8-year long observations of surface ozone at a research tower situated in the East China Sea, which was built and operated by Korean scientists. In this small marine region off the coast of Asian continent, there are ongoing ozone observations at several remote island sites in Japan as part of the EANET monitoring activity. However, this new site is located further west, making it (as far as I know)

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the best location to capture long-range transport from Asian continent, and more importantly track the seasonal and long-term changes in ozone exported from the Asian continent. Hence the data itself is very unique and adds a great value to better understanding of ozone pollution in East Asia. The analysis made in the later part of this paper is based on conventional trajectory technique, so not very innovative, as the authors themselves noted (in section 4.3) that the underlying cause need to be further investigated in future. There are substantial errors and items that need to be clarified before publication.

Specific comments:

Abstract: The average ozone concentrations for all the period is mentioned, but this does not mean much, since this average is a result of a variety of factors. Throughout the paper, ozone concentrations are noted with the precision of 0.1 ppb, but this is not meaningful. I would suggest just 52 ppb instead of 51.8 ppb, for example.

Figure 1: The words “Yellow Sea” and “East Sea” are superimposed in the map. However, I find no need to write these names with a scientific importance, and suggest removing from the figure.

Section 3: Diurnal and seasonal variations are discussed with Figures 3 and 4. There are some errors and unclear phrases. Specifically:

Page 16752, Line 24: "monthly" variations should be "seasonal" variations

Page 16752, Line 9-10: Based on diurnal variations, the authors mention that ozone at IORS is influenced by Chinese outflow. This sentence is not logically sound, since diurnal variability is, in most cases, driven by local effects – emissions, chemistry, or meteorology. I would expect discussion of local effects. Also, the diurnal cycles (Figure 3a) are plotted for all the seasons. The appearance and magnitude of diurnal cycles depend on seasons - usually greater in summer than in winter. I would suggest showing seasonal cycles at IORS in four seasons first, and then compare (probably)

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summertime one with those at other sites.

Figure 3: The seasonal maximum is actually in autumn, not spring. Correct? There are both spring (higher) and autumn (lower) peaks observed at EANET stations, so this is consistent. A unique phenomenon is that the autumn peak is higher than the spring one here at IORS. Also, I would say that the spring peak is not April but "April-May". Latitudinal differences in the timing of the spring peak in this region is found in Tanimoto et al., GRL, 2005, so please look at it and add a bit more discussion.

Figure 3 again: I am not comfortable to see the plots of Trinidad Head, in particular for the diurnal cycles, since we can expect no link to IORS and other East Asian sites.

Figure 3 again: I think ozone data is available at Gosan site on Jeju Island. Can you compare IORS and Gosan?

Page 16752, Line 23: Do you mean ozone is removed by rain? The solubility of ozone is not high, so my understanding is that ozone itself is not effectively removed by rain. Can you please clarify or elaborate more?

Page 16754, Line 3-12: This paragraph should be moved to 2. Methodology section. "w.e.re" must be a typo.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 16747, 2015.

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