

## ***Interactive comment on* “Contributions of regional and intercontinental transport to surface ozone in Tokyo” by M. Yoshitomi et al.**

### **Anonymous Referee #2**

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The authors analyzed contributions of regional and intercontinental transport as well as the impact of local pollution to surface ozone in Tokyo, one of megacities in the world. The authors first evaluated their global chemistry-transport model against several operational observations located at remote, rural, and sub-urban sites in Japan. Then they made detailed model analyses with two resolutions (T21 and T63), and examined contributions from major source regions based on various sensitivity simulations. The analysis was extended to further details, for example, case study of pollution episodes. Quantitative analysis at urban sites (like Tokyo) is challenging but the authors made great effort in making the analysis more robust. I like the authors' idea to compare model runs by two resolutions, since this is often critical. The manuscript is generally well-written, scientific approach is sound, and the message being delivered to the readers is clear. I recommend this paper for publication, but would like to see the authors

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address the points listed below.

abstract: 2.4 +/- 7.6 ppb is not only small but statistically significant.

page 10405: TF-HTAP (2007) reference can be replaced with TF-HTAP 2010, if already available to public.

page 10405: The authors listed several papers for the evidence of increasing ozone during the past decades over Japan. More recent papers can be added here, for example, Tanimoto, Atmos. Environ. (2009) focusing on observations at Mt Happo, and Tanimoto et al. Geophys. Res. Lett. (2009) describing model analysis at nine EANET and WMO/GAW surface sites.

page 10409: The authors noted several factors to explain model's inability to reproduce ozone at urban area close to Tokyo. I realize that land-sea breeze affects diurnal changes and transport of ozone around Tokyo Bay. How is this treated in the model? Is this local meteorology reproduced by the T63 model, more or less?

page 10409: ...The mean bias and RMSE are generally less than 10 ppb... Looking at Table 2, I would say 5 ppb instead of 10 ppb.

page 10410: ...CO is underestimated during pollution episodes ... Is this because of underestimated emissions, or insufficient model resolution?

Table 2: Tsukuba, Ijira, and Banryu sites are categorized as "urban". "Sub-urban" would probably be better.

Figure 9: What is time resolution of these data - 3 hrs? Are these data afternoon only (similarly to Figure 3), or whole day? Surface ozone in Tokyo (x-axis) is modeled results, right? Maybe better to explicitly mention it in the caption.

Table 6: The authors focused on high-ozone episodes in Tokyo and discussed source contributions. Looking at Figure 4, similar ozone enhancements occurred at Tappi and Happo on April 6, April 17-20, and April 28, 2001, suggesting that the influence of

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these high-episodes was spreading over wider area, say Honshu region, since behaviors at Hedo and Yonagunijima are greatly different. On the other hand, the model underestimated these episodes at Tappi and Happo. Any comments on this point?

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 10403, 2011.

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