

# ***Interactive comment on “Long-term Variations in Ozone Levels in the Troposphere and Lower Stratosphere over Beijing: Observations and Model Simulations” by Yuli Zhang et al.***

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Received and published: 6 May 2020

Dear Editor,

We noticed there are similar recent studies which diagnosed the long-term changes of ozone using different datasets. Most of these datasets are satellite observations or surface measurements. The data quality of satellite observations in troposphere are not as good as in stratosphere. Surface measurements are precise, but only surface O<sub>3</sub> are measured. Compared to satellite data, our ozonesonde observations are more precise with much higher vertical resolution. Compared to surface measurements, we have the profiles from surface to ~30km. So, ozonesonde is the best dataset to in-

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investigated the ozone variation not only near surface but also in the whole troposphere and lower stratosphere. However, there are only a few stations have ozonesonde data and some of stations only measured for a short time. Beijing ozonesonde data is the longest observation (since 2002) of the ozone profile over the North China Plain. This dataset is once used in Wang et. al. (2012) to show positive trends in the period of 2002-2010 which raises many concerns (more than 60 citations). Now, we extend the observed time series where we used CLaMS to show the trends after 2010. Fortunately, we found a sudden decrease in 2011 which related to stratospheric transport, and we found negative trends in recent years which mainly due to the reduction of precursors. I think the dataset itself, the trends it revealed and the sudden decrease are the most innovative parts of this paper. As for the mechanisms, we discussed the two main reasons which is responsible for the change of trend and the sudden decrease. We use NO<sub>2</sub> from OMI to show the influence of precursor on the change of trend, and we use CLaMS model to show the influence of stratospheric transport on the sudden decrease of ozone in 2011. There are other precursors which need more data and other possible reasons such as changes in meteorology, but they are not the main point of this paper. It is a huge task to investigate all the mechanisms responsible for the O<sub>3</sub> change. We would like to deeper dive on other mechanisms in the future.

Reference: Wang, Y., Konopka, P., Liu, Y., Chen, H., Müller, R., Plöger, F., Riese, M., Cai, Z. and Lü, D.: Tropospheric ozone trend over Beijing from 2002–2010: ozonesonde measurements and modeling analysis, *Atmos. Chem. Phys.*, 12(18), 8389–8399, doi:10.5194/acp-12-8389-2012, 2012.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-1145>, 2020.

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