This study investigated the long-term trend of ozone in China during 2014–2020 based on the surface observational data of O3, NO2 and CO, VOCs measurements at Beijing and Shanghai and a zero-dimension photochemical box model. The authors found that ozone levels increased from 2014 to 2017 and reached a plateau after 2017, then decreased in summer and increased in winter from 2019 to 2020. Using the photochemical box model, the changes in ozone sensitivity regime were reported to be the cause of the O_3 changes. The methods are clearly outlined and the conclusions are solid. I have the following comments that can be addressed.

General comments

Many previous studies have examined the long-term ozone trend over China and revealed the similar patterns and causes as in this study. The authors did not fully emphasize the novelty of this study and should illustrate what are the new scientific findings or the new tools to explain the findings. In my view, the usage of VOCs measurements and the box model is probably the new data and tool to analyze the distinct seasonal and spatial O3 variations.

Also, the authors attributed the O3 trends to photochemistry along, which is incomplete. For the long-term trends, emissions exert a dominant role in the changes in pollutants, but for a short-term from 2019 to 2020, year-by-year changes in meteorological field can largely influence the O3 distribution through changes in both photochemistry and transboundary transport. From the analysis, the authors indicated that the shift of ozone sensitivity regime was the reason for the unique O3 changes in 2019-2020, but they did not exclude the physical processes due to interannual variation in meteorological fields. It can be discussed in the manuscript.

Specific comments

Lines 168–175: Please descript the VOCs data in detail since that they are the key data for the conclusions.

Line 203: Four O3 metrics were used in this study. What are the similarities and differences between the results using the four metrics?

Line 214: The high O3 over the North China Plain is also related to the high temperature extremes (e.g., Wang et al., 2022).

Lines 267-284: The description and table 2 are the O3 trends reported in previous findings , which should be listed in introduction, unless they were compared with the data in this study in details.

Line 352: The author noted that transport effects were not considered, but they are important in the variations in O3 concentrations in China (e.g., Yang et al. 2014, 2022).

Line 408: I suggest the authors to add paragraphs to discussed the uncertainties and limitations in this study.

Figure 6: Reframe the colorbar. Label and color confusion.

Figure 7: Why only the NO2 and CO were shown here without VOCs?

Reference:

Wang, P., Yang, Y., Li, H., Chen, L., Dang, R., Xue, D., Li, B., Tang, J., Leung, L. R., and Liao, H.: North China Plain as a hot spot of ozone pollution exacerbated by extreme high temperatures, Atmos. Chem. Phys. https://doi.org/10.5194/acp-2021-849, 2022.

Yang, Y., Liao, H., and Li, J.: Impacts of the East Asian summer monsoon on interannual variations of summertime surface-layer ozone concentrations over China, Atmos. Chem. Phys., 14, 6867–6879, https://doi.org/10.5194/acp-14-6867-2014, 2014.

Yang, Y., Li, M., Wang, H., Li, H., Wang, P., Li, K., Gao, M., and Liao, H.: ENSO modulation of summertime tropospheric ozone over China, Environ. Res. Lett., 17, 034020, https://doi.org/10.1088/1748-9326/ac54cd, 2022.