

Interactive comment on “Impact of Western Pacific Subtropical High on Ozone Pollution over Eastern China” by Zhongjing Jiang et al.

Anonymous Referee #1

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Review of “Impact of western pacific subtropical high on ozone pollution over eastern china”

General:

This paper examines how much impact the variability of Western Pacific Subtropical High (WPSH) have on the surface ozone over East China. A combined modeling and observational approach reveals the impact quantitatively as well as the involved chemical and physical processes. The manuscript is clear and well written, and I believe that the quantitative analysis is very important for a better understanding of summertime air quality in China. However, there are some major points which have to be clarified and discussed further, as described below.

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Major points:

In this study, the budget analysis of PBL ozone are performed using the diagnostics calculated in the GEOS-Chem model to investigate how and how much the variability of WPSH induces the changes in the summertime ozone over East China. However, the relationships with the meteorological conditions are not fully investigated, as pointed out below. Further analysis and discussions are needed.

1) The ozone dry deposition process should be also taken into consideration for the budget analysis, because the variability of the WPSH influences not only the four processes diagnosed here (i.e. chemistry, transport, mixing and convection) but more or less the dry deposition process.

2) There is lack of quantitative analysis to clarify which meteorological variables (solar radiation, temperature, RH. . .) are key factors that lead to the changes in ozone chemistry (i.e. chemical production/loss of ozone). Further analysis is needed to clarify this point.

3) Intensities of convective activities associated with WPSH variation are supposed to be very large. However, the large differences in convective activities between weak and strong WPSH only induces the small differences in PBL ozone, as you pointed out (Figure 4). It is required to explain the mechanism.

4) In Figure 1c, the absolute differences in the WPSH-index between weak and normal WPSH days (purple and green dots) are several times larger than those between strong and normal WPSH days (red and green dots). It is required to discuss how this asymmetry affects the later composite analysis.

Minor comments:

- L103 to L106: If there are a reference paper or technical report on the observation data used here, it should be cited.

- L114: should “for 2014-2018” -> “for 1979-2018”? (see Figure 1a and 1b).

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- L114 to L115: If there are a reference paper or technical report on the “GEOS-FP database”, it should be cited.
- L168: should “Cloud convection” -> “Vertical transport due to convective transport”?
- L178: I suppose that “MEGAN and soil NO_x emissions turned off” means “BVOC and soil NO_x emissions are set to zero”. Is it right?
- L209: What is the ratio of “cities with significant differences”? This information should be described.
- L251 to L252: “high-pressure center in Northwest Pacific is . . . shifted slightly southward (Figure 3b)”. The readers cannot know which the southward shift is slight or not, because the difference in SLP between strong (weak) and normal WPSH days is only showed in Figure 3a (3b). The SLP composite under strong (weak) WPSH days should be also depicted in Figure 3a (3b).
- L257: Does “abnormal changes” mean “asymmetric changes” in L254? Is it an appropriate expression in the context?

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