The manuscript by Zhang et al. analyzes the influences of climate variations on long-term O_3 trends in China and explores the linkage between O_3 and a dominant atmospheric circulation system, using a modeled tropospheric ozone dataset and two western pacific subtropical high (WPSH) indexes. They conclude that the effect of the WPSH on regional O_3 is attributed to the changes in air temperature, precipitation, and winds associated with the WPSH's intensity and positions. However, the discussion of EOF analysis is lack of sufficient explanation on the association of O_3 patterns with WPSH. The significance of this paper is not expound sufficiently. The author need to highlight this paper's innovative contributions in abstract and conclusions. Here list some of my main concerns.

1. Climatologically, the WPSH activities with east–west expansion, and north–south movement significantly affect the daily, seasonal, interannual, and longer-term meteorological fields and climate variations over central and eastern China. which temporal scale of WPSH exerts the most significant effect on tropospheric O_3 in daily, seasonal, interannual, and longer-term variations? Please add more discussions on WPSH climatology and environment effects.
2. There are the distinct patterns in spatial distribution of WPSH with most significant seasonal (sub-seasonal) variations. Why can leads the WPSH to lower O_3 levels in the Pearl River Delta (PRD) region (line 32)? There is a misleading on the relation between the WPSH and lower O3 levels. How can WPSH affect the tropospheric O_3 over the Tibetan Plateau and Northwest China? It is suggested to focused the central and eastern China with the direct WPSH effect.
3. Lines 38-41: Please clarify how the effect of the WPSH on regional O3 depends on the spatial proximity to the WPSH. The WPSH position or spatial distribution is mostly controlled by the ridgeline of the WPSH with north–south shifts. why is the ridgeline index of WPSH not used in this study? The effects of the WPSH on O_3 interannual variations to the changes in air temperature, precipitation, and winds associated with the WPSH's intensity and positions. The tropospheric O3 is produced with photochemical reactions of O3 precursors under sunlight. How is the downward solar radiation as the most important factor of meteorology? Please

check the correlations.

4. Lines 20-21: The present study used a unique tropospheric O3 dataset. Please clarify how is the unique in the simulated dataset? Why are the WFR-Chem simulated meteorological elements not used the climatic analysis of atmospheric circulations?
5. Text 1 & Fig S1: "Considering large uncertainties of sampled ambient air quality data in the first several years, we collected monitoring data in summer 2016 to verify modeled O_3 concentrations." Some stations were built in 2015, but the time period of sampled surface O_3 concentrations is still longer than one year in China. Why did author just choose the O_3 data in 2016 summer? The modeling results seems to be not very well in 2016, it is suggested to extend the observation dataset. Besides, due to the diurnal variation of O_3, the line chart is not the best way to present the reasonability of model simulation, makers without line would be better.
6. Lines 152-153: "This trend possibly overwhelms interannual changes in the WPSH in the recent two decades." What does 'this trend' refer to? Growing O_3 pollution or strengthen WPSH?
7. Fig S2: We cannot intuitively see the difference in the interannual trend of WPSH-I1 before and after 1999. Suggest to add the liner trend of WPSH-I1 from 1980 to 1999 in Fig. S2, to better display the reinforcement of the WPSH on a decadal scale in the recent two decades.
8. Lines 172-174: "In the present study, we used the EOF analysis in WRF-Chem simulated gridded (20 km × 20 km) seasonal O_3 concentrations across China to extract annual O3 change features from 1999 to 2017, respectively." I am not quite clear on what 'respectively' refers to? EOF analysis for each year or at each grid?
9. Line 243: "This inland region covers several major urban agglomerations (UAs) in China". 'UAs' has appeared in the previous context.
10. Lines 271-271: "Since O_3 concentrations are positively correlated with the WPSH-I1 (Figs. 3-5)" WPSH-I1 is not mentioned in Fig 5, please check the citation of figures.
11. Fig. 3: The relative analysis of the association of WPSH with PCA2 and PCA3 are

not yet described in the manuscript, please add them. Besides, third EOF pattern of O_3 is absent.

12. The time period for climate mean in Fig. S5 is 1999-2017, but it becomes 1980-2017 in Fig. S6. Why did author choose the different time periods for climate mean?
13. Fig.4 & Fig. 8: The correlation of observed surface O_3 concentration and WPSH-I1 is also significantly negative in YRD, which is not mentioned in the analysis of Fig. 4. However, the positive contribution of meteorology was characterized by positive correlation coefficients between the WPSH-I1 and scenario 2 modeled O_3 concentrations in the eastern seaboard area in Fig. 8b. The conclusions appear to contradict each other. Please provide an explanation.
14. Lines 315-316: "We also estimated the correlations between O3 concentrations averaged over the six UAs across China and the WPSH-I1 from 1999 to 2017 (Fig. S7). The positive correlation coefficients between the mean O3 concentrations and the WPSH-I1 in each of the UAs are presented at the top of each column." Fig. S7 is the correlation between O_3 concentrations and PCA1, please check the citation and add the legends. What do the Y-axis and X-axis of the inset figure stand for? Suggest to add the correlation coefficients in each subplot, which is more intuitive to illustrate the positive correlation than scatter plots.
15. Lines 332-333: "Considering that summer precipitation in China is sensitive to the western ridge point of the WPSH". It is necessary to cite some references.