

This study examined the possible mechanisms for the ozone pollution events (OPEs) in North China during 2014-2017 using GEOS-Chem model together with an integrated process rate (IPR) analysis. They found that OPEs in North China occurred under a typical weather pattern with high daily maximum temperature, low relative humidity, anomalous southerlies and an anomalous downward air flow caused by an anomalous high-pressure system at 500 hPa. The topic is of interest, the method is sound. I would suggest for publication after addressing my comments below.

Page 2 Lines 11-13: Please reframe this sentence.

Page 4 Lines 14-15: I don't think the original resolution of MERRA2 data is the same as GEOS-Chem model. The meteorological data authors used are modified to fit the model resolution.

Page 4 Lines 23-24: How did the authors detrend the meteorological parameters to remove interannual or seasonal variability? Please specify the method or provide formula they used.

Page 5 Line 7: The annual emission from 2014 to 2017 are applied in the simulation, but the authors did not rule out the impacts of changing emissions on the OPEs selection and IPR analysis, although the changes in emissions in the four years are not likely to be very large.

Figures: All the figures and analysis are lack of significance test. Please add in.

Page 7 Line 9: I on day 'd'.

Page 8 Line 9: It should be 850 hPa 'meridional winds' and 500 hPa 'zonal' winds.

Page 11 Line 9: Before analyzing vertical profiles of each process, the authors should give vertical profile of O₃ concentrations in terms of seasonal mean and anomalies during OPEs.

Page 11 Line 24: 'horizontal advection' is the compensating from the increasing ozone from the figure. I don't think it should be listed as the dominant processes that lead to OPEs, although the negative value is large.