The authors examined source contributions of anthropogenic, background, and individual natural sources to surface ozone over China, as well as their differences between 2016 and 2017, in a chemical transport model GEOS-Chem. They found that natural background accounted 70-80% of surface ozone in China. Domestic anthropogenic sources contributed 30% during May-August and up to 69% during polluted ozone days. Ozone increases in 2017 relative to 2016 are due to hotter and dryer weather conditions. This topic is of interest and the manuscript is well written. I would suggest publishing after addressing my comments below.

My main concern is about the method for calculating source contribution. The authors considered the contribution from one source as the differences in ozone between BASE and sensitivity simulations with individual source emissions turned off. They did not consider the nonlinearity of source contribution. As the authors mentioned in the discussion that zero-out and 20% off emission would produce different contribution value. Ozone chemistry is complex. The nonlinearity exists non only in the amount of emission perturbed, but also in the species of emissions (VOCs or NOx) and the location of emission perturbed. Directly comparing the source contribution derived from the differences of two simulation could be biased. The authors needs to quantify how large the nonlinearity would perturb the results with more simulations or, at least, discuss the potential biases of results related to the nonlinearity.

Minor comments:

The ozone contribution from each source was estimated as the ozone difference between the BASE simulation and each sensitivity simulation for BVOC, lightning NOx, soil NOx and biomass burning emissions. But the stratospheric contribution was quantified using an ozone tagging method. Is it appropriate to compare contributions derived from two different methods? How large the uncertainty it has?

How does the model treat the emission injection height? In the recent study, Yang et al. (2019) found that uncertainty in anthropogenic emission height strongly affects surface SO2 concentration by about 80%. The inaccurate emission injection height can also lead to the bias of simulated surface ozone concentration.

Line 320: What are the ‘interactional’ and ‘pure’ contributions?

Table: I suggest adding values for percentage change.

Reference:
Yang Y., Smith S. J., Wang H., Lou S., and Rasch P. J., Impact of anthropogenic emission injection height uncertainty on global sulfur dioxide and aerosol distribution, J. Geophys. Res. Atmos., accepted, 2019.