Reply to Anonymous Referee #1

We thank the reviewer for the careful reading of the manuscript and helpful comments. We have revised the manuscript following the suggestion, as described below.

Ozone pollution is an emerging environmental issue in China, especially after the PM level started to decline. This paper analyzes surface measurements of ozone concentrations over 223 cites in Eastern China during 6 months in 2015 and quantitatively reveals the severity of ozone pollution during that period. A special version of WRF-Chem model developed by the authors is employed to investigate the relative contributions to the ozone formation from different sources, such as industry, transportation, residential and biogenic sources. The finding of industry sources as the culprit of the ozone pollution in Eastern China provides guidance on the future emission control strategy for police makers. Hence, I recommend accepting this paper by ACP after the authors address three minor comments below.

1 Comment: In Table 2, the comparison of pollutants between 2013 ad 2015 shows that implementation of the emission control plan reduced NO_x and PM concentrations but resulted in a even worst O_3 pollutions. Such a phenomenon is quite interesting and should be highlighted in the abstract and conclusion. Does any satellite observation (such as OMI or TES on Aura) capture such a change of ozone in Eastern China?

Response: We have included a sentence in the abstract: "*Analyses of pollutants observations from 2013 to 2015 have shown that the concentrations of CO, SO_2, NO_2, and $PM_{2.5}$ from April to September in Eastern China have considerably decreased, but the O_3 concentrations have increased by 9.9%.*". We have also classified in the conclusion: "*Analyses of air pollutants observations in 66 cities from 2013 to 2015 have shown that, although implementation of the APPCAP has considerably decreased the CO, SO_2, NO_2, and $PM_{2.5}$ mass concentrations from April to September in Eastern China, the [O_3] have increased by 9.2% and the frequency of O_3 exceedance with hourly [O_3] exceeding 200 μg m^{-3} has increased by about 25% in the afternoon.*"

Satellites have also observed the O_3 increasing trend in Eastern China from 2005 to 2014. We have clarified in Section 3.1: "*The ozone monitoring instrument (OMI) satellite observations have also shown that the annual O_3 concentration has increased by 1.6% per year over central and eastern China from 2005 to 2014 (Shan et al., 2016).*"

2 Comment: By turning off each emission source individually in the model, the authors tease out the role of each type of emission. One further question readers may have is what precursor species from each emission source are related to the ozone formation. It would be clearer if major VOC and NOx concentrations could be listed from each sector in the emission dataset used by the WRF-Chem model.

Response: We have added SI-Table 1 in the Supplementary Information (SI) to present the emission rate of major O_3 precursors from different sources and clarified in Section 3.3: "*SI-Table 1 further presents the emission rates of major O_3 precursors from different emissions sources in the model domain during the study episode. The industrial source dominates the VOCs and NO_x emissions, playing a key role in the O_3 formation. The transportation source emits more NOx and active VOCs, such as olefins and aromatics, than the residential source, contributing considerably to the O_3 formation.*"

3 Comment: Authors mentioned the possible uncertainty from the simulated meteorological conditions to explain the model biases in reproducing ozone distribution. Would a nudging of surface wind and temperature be helpful to minimize the influence of meteorology?

Response: We have clarified in the conclusion: "*Meteorological conditions play a key role in the formation of air pollution, determining the formation, transformation, diffusion, transport, and removal of the air pollutants in the atmosphere (Bei et al., 2010, 2012). A nudging of wind and temperature fields using observations generally improves the simulation of meteorological fields, reducing the model biases in reproducing the O_3 temporal variation and spatial distribution. So future studies are needed to improve the*

meteorological fields using the data assimilation, such as the four-dimension data assimilation (FDDA)."