

## ***Interactive comment on “Substantial ozone enhancement over the North China Plain from increased biogenic emissions due to heat waves and land cover in summer 2017” by Mingchen Ma et al.***

**Anonymous Referee #1**

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This study investigates the impacts of the meteorological factors and isoprene emissions on two severe ozone pollution episodes in North China Plain (NCP) by combining ground-level observations and WRF-CMAQ simulations. The effects of hot, dry and stagnant weather conditions, as well as varied factors influencing isoprene emissions, such as land cover change, high vapor pressure deficit (VPD), and urban landscape, are examined to explain the causes of ozone pollution episodes. Results show that urbanization and land cover change made significant contributions to the enhancement of MDA8 ozone in the past decades. Such effects have not been considered in most

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of previous studies. The topic of this study well fits the scope of ACP, however, some revisions are required before the acceptance.

GENERAL The main flaw of this study is the confusion of time scales. Land cover change and urbanization usually occurs at annual to decadal time scale. However, this study focuses on ozone episodes which happen in several days. It's not scientifically reasonable to estimate the effects of land cover or urban landscape on ozone extremes. Instead, it would be helpful to examine whether land surface changes contribute to an overall enhancement of ozone concentrations during 2010s compared to 2000s.

It is clear that ozone pollution level increased fast from 2014 to 2017 (Fig. 4). However, land cover or urban landscape should not change significantly within these 4 years. As a result, the main causes of more pollution episodes are related to anthropogenic emissions, atmospheric transport, and/or weather conditions, instead of land cover change. In addition, most of the isoprene observations used by this study were obtained more than ten years ago, making it difficult to evaluate the impacts of land cover change and urban landscape on BVOC emissions, which are the major merits of this study. From this aspect, these changes made limited contributions to the high ozone episodes in 2017, especially compared to the year 2014 (NOT 2003). And the title of the paper is inaccurate.

SPECIFIC Page 3, line 69. The North China Plain should be defined with specific latitudes and longitudes or detailed descriptions. Page 8, line 194. The author could consider remove the word “medium” because the medium ozone pollution events are not analyzed. Page 8, line 200. Fig. 1 is in the text rather than supporting information. Page 8, lines 219-220. The sentence “Please note that. . . .” is unnecessary and should be removed. Page 11, Fig.4. The coordinate and scale for the daily total precipitation (yellow bars) are not shown. Page 11. Fig. 4. It would be better that the time series of VPD are exhibited, because the article discusses the effect of VPD on isoprene emissions in Sect.3.3. Figure 4: In addition to the two episodes examined in 2017, the similar hot, dry and stagnant weather condition shown several times during

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2014-2017, such as 16th – 22th July in 2014, 6th – 14th July in 2015 and 8th – 16th July in 2017. Why these favorable conditions do not result in ozone episodes? Page 15, Fig.7A. The difference between case4 and case5 is 15% increase in isoprene emissions in Beijing, but why the simulated isoprene concentration is much higher in case5 compared with it in case4? Page 16, Fig.8. The abbreviations of NMB, NME, MFB and MFE should be explained in the figure capture. The same issue could be considered in text line 343.

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