

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2020-1302

Anonymous Referee #2

Referee comment on "Unexpected enhancement of ozone exposure and health risks during National Day in China" by Peng Wang et al., Atmos. Chem. Phys. Discuss.,
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This manuscript investigates the causes of high O₃ episode during Chinese National Day Holiday using CMAQ modeling. The high O₃ concentration is found to be caused by enhanced anthropogenic emissions and regional transport. Further, the health risks of these high O₃ episode are estimated based on the response function of premature mortality of O₃ exposure. The scope of this manuscript is of interest and fits the Atmospheric Chemistry and Physics journal. However, the illustration of the manuscript makes it a bit difficult to review fairly. The readability can be easily improved by elaborating several key terminologies and large fonts in figures. For example, two terms "O₃_VOC" and "O₃_NO_x" are discussed throughout the manuscript to diagnose the O₃ chemistry, but they are not clearly defined in the manuscript. The font of figure 3 is too small. The color scheme in figure 4b is impossible to read. I believe this study is publishable, but requires substantial revisions.

Comments:

- The importance of regional transport. Look at Figure 2a CNDH, the O₃ concentration is up to 100 ppb in south China sea around Hainan and it is higher than the mainland China. Is this real? If so, what's the impact of such high O₃ concentration on southern China? Is this the major cause of the high O₃ episode during CNDH? Figure S5 suggests the prevailing wind direction is from mainland to ocean during CNDH in CMAQ. Is this consistent with local measurements? Line 217 indicates the south wind is prevailing. I am confused.
- Line 24. This "303%" overstates the health risk, because the absolute difference is small (0.4 vs 1.6 in Figure 5).
- The following terminologies/calculations should be elaborated: O₃_VOC, O₃_NO_x, O₃ production rate, and exceeding rate (Figure 1c).
- To corroborate the estimated health risks, the estimated daily mortality (non-accidental causes) should be compared to real mortality data, if possible.