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Comment on acp-2021-1095

Anonymous Referee #1

Referee comment on "Joint occurrence of heatwaves and ozone pollution and increased health risks in Beijing, China: role of synoptic weather pattern and urbanization" by Lian Zong et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1095-RC1, 2022

The authors have presented a manuscript that identifies the health effect of heatwaves and ozone in Beijing, China. The authors identified this effect separately and combined. Furthermore, the authors proposed the identification of the effect for urbanization and synoptic systems, with the aid of composites. In general, the article is interesting but needs improvements.

Major issues:

The methodology to identify episodes of interest is clear but the explanation about the exposure functions is weak. The authors just cite Liu et al (2021) and Ying et al (2017) for the temperature and ozone parameters. Also, I do not understand why the authors use RR for Liu et al and ER for Ying (lines 120-125). Specifically, the authors state: "every 1°C increase in the daily Tmax above 31.5°C, the largest RR of mortality caused by high temperature in northern China was 1.002". Then, we see Table 3, the Tmax for Urban HW, the value is 36.1, then how the authors obtained 4.76(4,76,4.77)? I thought that It might be (36.1-31.5)*1.002 = 4.6092, but not. Please, clarify and include a similar explanation for ozone.

In Figure 5, the authors show the diurnal cycle for some variables claiming that there are significant differences. Do the authors mean statistical significant in the difference, perhaps after applying a test Mann-Withney? Was this test applied to the point values shown in Figure 5? Finally, neglecting the contribution of O3 precursors to explain the difference in O3 during HW events (line 160), I think it is wrong. Even the authors state in the manuscript that during HW events there are more biogenic VOC emissions. Also, the wind speed is higher during HW, which favours the transport of pollution, from rural to urban areas for instance. Actually, a recent paper published in ACP shows the contribution of local and regional emissions to air quality (https://acp.copernicus.org/articles/21/18195/2021/).

Minor issues:

Line 77-80, one paragraph of just one sentence. Each paragraph should have at least three sentences, intro, body and conclusion.

Line 115, then again, which beta did you use?

Line 123-124, why do the authors use RR for temperature and then ER for ozone?

Figure 2 is not good. Provide a better figure.

Line 151, which test do the authors use?

Lines 165-174: I understand that we might expect lower risk in traffic and urban station for ozone, but you mentioned in line 166 that ozone caused a reduction of 2.44% which means risk lower than 1. More explanation is needed.

Line 177, Please, do not overuse abbreviations, WPSH is not needed.

Line 196, UHI is not defined.