



EGUsphere, referee comment RC1
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Comment on egusphere-2022-77

Anonymous Referee #1

Referee comment on "Circulation-regulated impacts of aerosol pollution on urban heat island in Beijing" by Fan Wang et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-77-RC1>, 2022

This paper presents the results of the aerosol impact on urban heat island (UHI) over Beijing. The authors first analyzed the 2016-2020 observations to link UHI intensity (UHII) with wind direction and PM_{2.5} pollution, then used WRF-Chem regional model to do the perturbation simulations of a haze episode in January 2010 to substantiate the underlying mechanism of such linkage. The general conclusion was that aerosols, either locally emitted or transported and cumulated through regional circulation, reduced UHII via aerosol-radiation interactions over the study region. Though the research topic fits into the ACP scope and the paper was concisely written, more analysis and discussions are needed to reconcile the mismatch of time period and time scale between the observational and modeling analysis to make the conclusion robust under different seasons and aerosol pollution conditions. This is especially important to the regions like Beijing, who has experienced the rapid changes in landscape and pollutant emissions over the past decade. In addition, quite a large portion of the discussion were descriptive and qualitative, while more quantitative analysis should and can be done with the available observation and simulation data.

On top of the above comments, the authors are also expected to address the following specific points:

- Section 2.1: Can the authors elaborate what is the criteria they chose the weather

stations for UHI estimate? This information is important since the selection of urban vs. rural stations may skew the results. Only 2 urban weather stations were selected for the analysis. How representative were they for Beijing?

- Section 3.1 – Fig. 1 discussion: PM2.5 data from all observation sites, urban or rural, were selected for daily average calculation to distinguish between polluted vs. clean days. Was there large PM2.5 gradient between the urban and rural sites? What was the impact of such PM2.5 gradient if it existed?
- Section 3.1 – Fig. 2 discussion: A figure or table showing the average PM2.5 conc. over urban/rural areas under each prevalent wind direction should be provided to support the argument.
- Section 3.2 – in Fig. S2, how did the authors derive the observed time series of UHII? Was it the average UHII at the same days/hours from 2016 to 2020, or other? Since the modeled UHII reflected the heavily polluted condition, why not compare the modeled UHII with the observed one under the pollution condition?
- In Line 158: "...and differences in values are generally within the trusted range". What is the trusted range of UHII comparison? How did modeled wind and temperature compare to the respective observations?
- Line 168: how was heat storage calculated?