

Response to the Editor's comments

Following the editor's last two comments, we have made minor revisions in the final revised manuscript. Notably, we have modified a sentence in the manuscript that could be subject to interpretation and could be perceived as inaccurate, and also added a brief discussion on the influence of large scale features.

Here are the two minor revisions mentioned by the editor:

“In the revised manuscript Line 277: “The analysis of PBL heights showed that the convection was still present at night in the Urban run, caused by the important nighttime UHI”. In this reviewer's opinion, this statement is unfair, as there is no evidence demonstrates a relationship between convection and relatively higher nocturnal PBL. In fact, the nocturnal is generally stable stratification, like its height is around 300 m in present study. The authors may cite some researches to clarify this point, i.e., the higher nocturnal PBL caused by UHI can maintain the convection. Otherwise, the sentence would be better to “The nighttime UHI induced higher nocturnal PBL indicates less atmospheric stability in the Urban run, which favors the possibility of rainfall occurrence.””

Response: Indeed, even in the Urban run, we found that the atmosphere appears to stabilize at nighttime, as we see a decrease in the PBL height. Nevertheless, it's rather the fact that the Urban PBL is twice as high as the No-Urban PBL that suggests that the atmosphere remains relatively less stable in the Urban run. In this sense, we realize that the sentence mentioned by the editor might be slightly misunderstood, and it therefore has been modified by the following sentence in the revised manuscript:

“In the previous subsection, we found that the nighttime UHI induced higher nocturnal PBL, which indicates less atmospheric stability in the Urban run and favors the possibility of rainfall occurrence.”

“To make more complete article structure and research background, my opinion remains that the author may add some discussions regarding the influences of Tibetan Plateau and the Indian Ocean on India summer Monsoon.”

Response: We agree that it is important to remind the reader of the broader context of the study, the Indian monsoon being a complex large-scale system. We have added a paragraph in the Introduction of the revised manuscript stating that urbanization appears as a local perturbation interacting with such larger scale dynamic factors mentioned by the editor. The following paragraph has been added:

“It is worth noting that urbanization appears as a local factor interacting with larger scale dynamic factors. For example, the Indian monsoon is known to be highly influenced by geographic particularities including orography on the West coast, but also in the Northern part of the country, where the Tibetan Plateau can influence aerosol concentrations, circulation, and precipitation (Liu et al., 2022). Thermodynamical considerations over the Indian Ocean can also explain rainfall sensitivity to large scale conditions, especially Northern India which is directly affected by the Bay of Bengal (e.g., Sheehan et al., 2023). Urbanization thus appears as a local perturbation with feedback to these large scale features.”