

We sincerely thank the reviewer for his thorough feedback and helpful suggestions that will improve the manuscript. We respond **in blue** to the comments (*in black, italics*) below.

This paper investigates the urban effect on the dynamics of the mixing layer height (MLH) in and around the city of Paris. It provides unique MLH measurements from ceilometers situated in inner-city, suburban, and rural areas under different wind conditions, together with wind measurements and turbulent latent and sensible heat flux measurements, to investigate differences in MLH and MLH growth rate between upwind, urban, and downwind areas. The results clearly demonstrate the effects of the urban environment and the downwind urban plume on MLH, MLH growth rate, NBL development, and their seasonal characteristics. The Introduction provides a good overview of previous field campaigns and studies of urban boundary-layer dynamics. The experimental design, methodology, and analysis are scientifically sound, and the topic is interesting and timely. The language of the manuscript, however, could be further polished, as there are several grammatical errors and some sentences are confusing or difficult to understand. I therefore suggest minor revision before publication. Below are some comments and questions that I have.

Main comment:

Sect 2.2.4 provides the measurements of soil moisture state, UHI, NO₂, PM₁₀ information, but except NO₂ was briefly mentioned to show the impact area of urban plume, the other quantities are not discussed in the analysis.

Thanks for pointing that out. We agree that further characterisation of the air pollutant concentrations on the case days adds value because of the study's implications for air quality. We added a few sentences in Section 3.1

We agree that explicitly considering the soil moisture state and UHI strengthens the discussion of the case study days. We added a brief discussion.

Minor comments:

1. *Line 43: "...nocturnal situations have a focus; the low-level jet..." change to "there has been a focus on nocturnal situations, including the low-level jet..."*

Thanks for flagging that. We changed the sentence accordingly.

2. *Line 45: "affects cloud formation and leads to" change to "affects cloud formation which leads to..."*

The sentence was changed as suggested.

3. *Line 52: "it is evident that..." change to ", and it is evident that..."*

Thanks for noting; we added "and" to the sentence.

4. *Line 66-67: change to "The transect is aligned with the dominant wind direction, running from SW to NE."*

We changed the sentence accordingly.

5. Line 94, line 120, “mixed-layer height (MLH)” change to “MLH”. There are several places where abbreviation is not defined at the first time when it appears or is defined multiple times, please do an exhaustive search of the abbreviations on the manuscript to correct them.

Thanks for pointing that out. We ensured that every abbreviation is defined at its first mention and removed duplicates. If abbreviations were defined in the abstract, they are again defined at the first occurrence in the main text. We propose to exempt the conclusion from removing duplicates, since redefining abbreviations there improves readability, making the conclusions comprehensive.

6. Line 114: “(Sect. SM S1.1), and used to” change to “(Sect. SM S1.1) and is used to”

We changed the sentence as suggested.

7. Line 165 – 167: change to “To detect along or across transect differences, wind direction sectors (Table 1) were defined using the city-centre DWL (JUS) data, analyzed from 1 h after sunrise to 0.5 h before sunset for gates between 300 m above ground level (agl) and the approximate top ALC MLH of the sites used.”

Thanks for the suggestion. The sentence was changed accordingly.

8. Line 170- 171: “Note the W1 day, a SW winds case, but for slightly <50 % of the time.” Change to “Note that W1 is a SW wind case, but only for slightly <50% of the time.”

The sentence was changed as suggested.

9. Line 237: “The LE flux is overall weak with values < 40 W m⁻² and hardly any spatial variations (Fig. 10).” Change to “.. weak, with values < 40 W m⁻² and hardly any spatial variation”

We corrected the sentence by adding a comma.

- Figure 5: please indicate the date of the measurement in the caption.

Thanks for the suggestion. We added the date in the caption.

- Line 327: “..., so are important for GR.” Change to “..., and are therefore important for GR”.

The sentence was changed as suggested.

- Line 332 – 333: May be you can consider to show a scatter plot of cumulative H flux and corresponding MLH can show the correlation between the heat flux and MLH.

Many thanks for the suggestion. We agree that this addition strengthens the overall argument of the paper. Since the heat flux observation sites do not match the MLH observation sites exactly, we calculate landcover-based fluxes for each MLH site. We use the dominant land cover of each eddy covariance site's footprint (Figure 7, 10) to

calculate a heat flux for each MLH site based on its landcover composition in a 10km ring (SM Table S2). We added a scatter plot of the cumulative H vs MLH for S1 to the manuscript, and the other days to the SM. Due to differing flux data availability, the computation was not possible for all days and sites. The correlation indicates that similarly high cumulative heat fluxes do not correspond to a similar MLH between sites. The central urban site generally shows a lower height compared to its heat flux than the rural upwind site. Differences between the upwind and downwind rural sites on multiple case days further suggest that additional energy from non-local processes, e.g. advective processes, plays a role.