First of all, we would like to thank the reviewer for useful comments and for rising important questions. The manuscript was revised in accordance with recommendations.

The manuscript presents a useful method to discriminate smoke and urban aerosols using a five-channel fluorescence lidar. The authors apply a linear separation of fluorescence signals and apply the POLIPHON algorithm to convert retrieved smoke fractions into mass concentrations. The technique is presented through multiple case studies with emphasis on smoke within the planetary boundary layer (PBL). Overall, the approach appears very promising, innovative and relevant for the discrimination of smoke/urban aerosols.
My recommendation is that the manuscript can be published after a few minor revisions. The dataset and overall concept are strong. The methodology and equations are well presented. A few minor points need further elaboration (clarify small methodological details and provide brief sensitivity checks) before publication.

Minor comments:

- *One minor suggestion that may worth clarification is the selection of the fluorescence threshold. It would be helpful to know how this threshold was chosen and how sensitive the smoke/urban separation is to that specific choice.*

  Formally, the algorithm contains no threshold. However, for low signals, the ratios of fluorescence backscattering in different channels become oscillatory. In data analysis, this manifests as oscillations in the retrieved fluorescence components. Normally, in the lower troposphere, we limit our consideration to values where $B_{513} > 0.5$ $Tm^{-1}sr^{-1}nm^{-1}$. Corresponding comment has been added to the manuscript.

- *Another aspect that may deserve further discussion is the stability of the reference spectra under varying humidity conditions. In particular, it would be useful to know whether any sensitivity tests were performed for high-RH cases or if they will be part of another article maybe. Since humidity can influence both backscatter and fluorescence, it would also be helpful to comment on the expected bias in the retrieved smoke mass under humid conditions. Even a brief estimate or qualitative discussion would strengthen the interpretation.*

  Humidity is an important factor in fluorescence measurements. The hygroscopic growth of particles may lead to fluorescence quenching. However, it affects all fluorescence channels equally. As shown in Veselovskii et al. (2025a), even near the cloud base, the ratio of fluorescence backscattering in different channels remains stable. Therefore, we did not observe any effect of relative humidity (RH) on the separation of fluorescence contributions from smoke and urban particles. Nevertheless, RH does affect the calculation of the aerosol backscattering coefficients for individual components. At this stage, we do not consider the retrieval of smoke mass concentration under high RH conditions; this is the subject of our future research. One criterion indicating that RH has no effect is that the aerosol backscattering coefficient β_{355} is well reconstructed by the sum $\beta^{U}_{513} + \beta^{S}_{513}$.

- *The linear separation approach is interesting, but a short justification of why it remains robust in mixed aerosol conditions would improve the methodology section. This is especially relevant where smoke and urban aerosols may strongly overlap.*

  We consider the aerosol as an external mixture, and the linear separation of component contributions is the best we can currently do. At this point, we lack a solid framework for analyzing the interaction between urban aerosol and smoke. In the revised manuscript we mention, that aerosol mixture us assumed to be external.

  Moreover, the definition of the background or urban aerosol state could maybe be described in slightly more detail. It would also be interesting to indicate how sensitive the results are to that definition.

  Our definition of the background urban aerosol comprises a wide range of particle types, including sulfates, nitrates, secondary organic components, black carbon, and others. Among these, the organic components are the primary contributors to fluorescence. Consequently, any change in the proportion between organic and inorganic fractions leads to a variation in the overall fluorescence capacity of the aerosol mixture. However, it does not provide significant influence to retrieval of smoke mass concentration. Recall, that in our algorithm, we use only shape of fluorescence spectra, which (in contrast to fluorescence capacity) for urban aerosol does not change significantly. In the revised manuscript we added a comment about composition of background aerosol.

- *Finally, for the case studies, a short statement on how representative the selected events are of the full dataset would improve the overall context. This would help to understand whether the examples shown are typical or more exceptional.*

  The episodes considered in this study are representative. In our previous publication, we analyzed variations in fluorescence spectra throughout 2023 and showed that the main spectral features are preserved across seasons. For the present study, we selected episodes to demonstrate different scenarios of smoke and urban aerosol mixing within the PBL. Individual spectra do not vary significantly from one episode to another, so the examples presented are typical. We added corresponding comment to Conclusion.

Technical suggestions:

1. *Line 125: Omit typo ":".*

   Done
2. *L183-183: I suggest changing the time label "23:00-24:00" to "23:00-00:00".*

   Done
3. *Figure 13: In the caption add "00:15-01:15 UTC"*

   Done
4. *Figure 21: In the caption and Fig. 21a, I suggest changing the time label "24:00" to "00:00".*

   Done