

Referee #2

First of all we would like to thank the Referee for the large amount of work he has done revising out manuscript. In the revised version, we tried to follow his recommendations.

“The English text will be improved once the proposed corrections are accepted and performed.”

The corrections suggested by Referee are introduced in the revised manuscript.

“Some citations are missing in various places and some others are proposed to be added (eg. lines 47, 81, 132, 224, 289).”

Citations are added

“It is not convincing that the detected aerosol layers correspond to smoke only, and not to other aerosol sources, as no air mass backtrajectory analysis with height has been shown. The authors should add these graphs in the supplement section.”

The smoke layers were identified by the fluorescence capacity. For the episodes considered it exceeded  $2.5 \cdot 10^{-4}$ , and no other aerosol type can provide it. The back trajectories for all considered cases show transport of smoke from North America (we added corresponding comment to the revised manuscript), but we would not like to overload the manuscript with additional figures.

“How convincing are the “*dry smoke events*” mentioned in the manuscript, when a complete air mass trajectory analysis is missing?”

In revised manuscript we removed “dry smoke layers” and use “layers with low water vapor content”. Water vapor is measured by lidar. Besides, high values of the fluorescence capacity are possible only in the absence of hygroscopic growth.

### Specific comments

“*line 51*: The paper of Wang et al., 2023, has to be omitted as it refers to a multi-wavelength elastic-Raman-fluorescence lidar system and not to a single-channel lidar as mentioned in the manuscript, as this placement there is misleading.”

Done

“*line 119*: I would ask the authors to provide in a Supplement section a new figure detailing the transmission spectra (zoom in on the Transmission curves for T between 0-20%) of the filters at the 5 wavelengths mentioned, so that the readers can see (in detail) the overlapping transmission curves between these filters. Based on Veselovskii et al., (2023, Fig. 1) we can clearly see these overlapping regions, so the authors have to discuss on any induced errors in the detected fluorescence signals and their role on the accuracy of the retrieved aerosol parameters. “

Transmission bands of the interference filters are completely separated. Some overlap in Fig.1 (Veselovskii et al., 2023) corresponds to the transmission bands of the interference filter (IF) and the dichroic mirror (DM) used for separation: reflection of the DM starts to decrease near the long-wavelength edge of the IF. This effect is the strongest when 560 and 610 nm channels are separated, however it decreases the power at the 560 nm channel for less than 2%. This is

beyond accuracy of our calibration and so was ignored. In revised manuscript we added a phrase to the system secription. Thus, probably no need to provide the Supplement section.

*“line 216: See comments there (about the definition of the  $nv$  parameter etc.).”*

Changed

*“page 21: For clarity reasons limit the longitude up to  $80^\circ$  only (Fig. 2).”*

Done