Anonymous Referee #1

We are grateful to Referee for careful reading the manuscript and suggestions. In the process of revision we tried to follow his recommendations.

The paper is well written and describes a new approach of an interference-filter-based aerosol fluorescence lidar with five channels. An aerosol fluorescence lidar is rather helpful to clearly identify pollen, wildfire smoke, and other fluorescing aerosol components and to separate them from mineral dust (that does only weakly fluoresce). I have only minor remarks. The second reviewer provided a good list of comments to the authors so I can be short.

line 71: What is the reason for fluorescence in the case of urban haze? Why is there a difference to wildfire smoke? What about pollen in this context? A few more words would be helpful.
The sources of the fluoresce in the urban haze are not completely understood at a moment. Organic aerosols could be important contributors to the fluorescence signal. As well, organic carbon fraction is probably responsible for strong fluorescence of the smoke. We added corresponding phrase in Introduction section.

line 76: The Adam et al. (2021, ACPD, Part 2) paper was reject and thus should not be cited. Adam et al., Part 1, is available (published).
We removed Part 2 from references.

line 148: At favorable conditions, aging of smoke particles is completed within 2 days. So, the particles were probably aged. However, smoke from North America is much older (10 days), and then may show different properties.
This the goal of our future studies, to see how the aging may influence the fluorescence properties.

line 185: With only one wavelength (355 nm) there is no (good) way to categorized smoke based on lidar ratio. 40 or 60 sr was found for smoke as well as for urban haze. Again, please use alternative citation. Adam et al. (2021) is not a good reference.
Yes, it is important to have 532 nm channel, to categorize the smoke. Unfortunately, we could not do it in the present configuration of the lidar. Reference for Adam 2021 is removed.

lines 197-200: Maybe one should mention that the presented aerosol typing is not optimum. Optimum would be dual-wavelength (355, 532nm) depolarization and lidar ratio observations TOGETHER with the fluorescence observations as well as with humidity observations.
We have added this comment to conclusion

lines 289-290: This is a valuable message of the work. Fluorescence observations at wavelengths < 532 nm are sufficient to distinguish fluorescing urban haze from wildfire smoke. That means, three wavelength lidar observations can be combined with fluorescence lidar observations.
We are in the process of preparation of this kind of the system.