First of all we would like to thank the Reviewer for careful reading the manuscript and for useful comments.

The paper contains new and complex lidar observations of pollen. A triple-wavelength polarization Raman lidar with aerosol fluorescene channel is built up and mixtures of pollen and anthropogenic pollutionare measured, as well wildfire smoke and dust outbreak events.
The paper is well written and clearly worthwhile to be published.
I have only minor comments.

P2, L45-49: The Finish group only measured lidar ratios? No depolarization ratios?
They presented recently in ACPD the pollen polarization measurements at 3 wavelengths. Corresponding reference and comment are added to the manuscript

P3, L63: LILAS is the abbreviation for…? Lille lidar for atmospheric studies …?
Added

P4, L95: How do you overcome the problem with the 1064 nm backscatter reference value? Are you using cirrus backscatter and set beta 532 = beta 1064? Otherwise, beta 1064 is rather uncertain! Please comment on that!
Yes, calculation of backscattering at 1064 is challenging. For the cases presented in the manuscript we were able to choose height range in the high troposphere, which was free of clouds and aerosols. Thus, molecule scattering was used as reference. We assumed that aerosol contribution is insignificant when lidar signal matched profile of molecular scattering and (simultaneously) the volume depolarization at 1064 nm was below 1%.

P4, L106: It is a pity that you had to remove the water vapor channel, and at the same time, RH is an important parameter in your study… , and you have to make use of radiosonde observations far away. In case of good observations of water vapor mixing ratio profiles, one can easily and accurately derive RH profiles by using weather model temperatures in addition.
Yes, water vapor is very important. Analyzing the data we used radiosonde data and the model also. Unfortunately only qualitative analysis of RH was possible. At present, the water vapor channel in the lidar is recovered.

P5, L125-138: I would prefer a table (maybe even in Figure1) with all the specific names for the substances (betula, …, poaceae…) and the translations in addition Quercus (oak) , Poaceae (grass), betula (birch) and so on, if that is possible…
We added translations of pollen to Fig.1.

P7, L194: I find that depolarization ratios of 5-7% are quite high! What is the reason, is that specific for Lille? Is that the remaining pollen impact.
Yes, we think this is contribution of remaining pollen. In June amount of pollen decreases but it still exists.

P8, L215-217: But usually smoke layers show low depol ratios of $<$0.05 at all wavelengths in the lower troposphere as the example in Haarig et al., Canadian smoke paper in ACP, 2018, shows. An exception is the observation shown in Burton et al. 2015, not the rule.

Yes, such strong dependence is more typical for high troposphere. However during September 2020 we observed numerous cases with strong spectral dependence of smoke depolarization in low troposphere. Corresponding publication is in preparation. We have added passage to the manuscript:

We should recall also, that increase of the particle depolarization ratio at 355 nm is more typical for the aged smoke layers in the high troposphere (Haarig et al., 2018), though we observed this increase at lower altitudes over Lille during smoke episodes in Summer – Autumn 2020.

P10, L289: BAE strongly depends on particle refractive index and shape, and EAE? only weak dependence , or even no dependence?... what do you mean here… ?

EAE has very weak dependence on the refractive index, so it is sensitive to the size only. It was discussed for the case of dust in our recent paper of Veselovskii et al., (Atm. Chem. Phys., 20, 6563-6581, 2020). EAE is also not sensitive for particle shape: computations for spheres and spheroids bring to the same result.

P14, L398: smoke – low depol … high GF

Corrected

P26, Fig 5: more than four hours of signal averaging! How sensitive are the results to changes in the aerosol conditions?

Smoke layer is very stable and results are not sensitive the choice of averaging interval. So we prefer to show averaged over night profiles.

P27, Fig 6: x-axis text starts with beta-1064, but shown is the beta-532 backscatter (in green)

Corrected

P29, Fig 8, again 5 hours of signal averaging! Please comment on signal averaging, and that you need stable conditions.

Corresponding comment is added.

The atmospheric conditions for these nights were stable so the profiles presented are averaged over approximately five hours.

P31, in Fig.9 very variable aerosol structures are visible, but in Fig.10 all nine hours are averaged. Please provide a comment on the impact of aerosol variability on the retrieval products.

Yes, 9 hours of averaging is a lot. Actually this interval could be decreased. But inside the PBL the variations of lidar signal and the fluorescence backscattering were actually not so strong, so we think that averaged over night profiles of particle parameters are representative. Corresponding comment is added to the manuscript.