Referee 1

Dear Referee #1, many thanks for careful reading of our manuscript and useful suggestions. Answers to your comments are reported below.

1. Mixing with local aerosols during transportation is explained as the reason for LR532 exceeds LR355 in 3000-3750 m layer at 23:20-01:20 UTC period. But, we cannot find that how the smoke is mixed with local aerosols. More explanation is needed.

Actually, situation when LR532> LR355 is quite typical for aged smoke and observed by many researches. It is usually attributed to the particle coagulation. In our measurements we observed it only in the center of the smoke layer during relatively short period, when concentration of the smoke particles was the highest. After 01:20 the residual of the plume could be partly mixed with boundary layer aerosol leading to LR532< LR355. Reviewer is right that on a base of our measurements we can't clearly evaluate the process of particle mixing, so the manuscript was modified and phrase about mixing with local aerosols was removed.

2. How the contribution of smoke layer to the total AOD was calculated? The wavelength of AERONET and lidar data is different.

Lidar measured extinction at 355 nm was extrapolated to 340 nm via Angstrom exponent. Corresponding comment was added to the text.
"Extrapolating lidar measured AOD to 340 nm via EAE, we can conclude…"

3. This is same question with 1. How the smoke plume was significantly diluted by local aerosols during the transport? When we consider the pathway of airmass in the backtrajectories, that cannot be the reason.

We have responded it in comment 1.

4. (26859, 13) butis !but is

Corrected

5. Figure 7. The data for 3:20-5:20 is missing in the figure.

Corrected

6. Figure 8. Please use the same legend at (a) and (b).

Corrected

7. Figure 9. The data for 3:20-5:20 is missing in the figure.

Corrected

8. Figure 13. The data for 3:20-5:20 is missing in the figure.
Corrected

Referee 2

Dear Referee #2, many thanks for careful reading of our manuscript and useful suggestions. Answers to your comments are reported below.

1. How do the authors calibrate the backscatter coefficient? They cite Ansmann et al., 1992, for that purpose; however there is always a need to find a reference height and value for each individual backscatter profile. It should be stated how the authors do that for their high resolution profiles, i.e., do they assume the same value and height interval for every single 2-min profile and if yes which one.

The reference height was checked for every single profile. It was done by analyzing lidar signal at 1064 nm, because it is the most sensitive to particle presence. The reference point is chosen inside the height interval, where 1064 nm lidar signal fits the model molecular signal. The corresponding comment is added to the text.
"The reference point, where particles scattering can be neglected, was found for every individual profile."

2. I do not agree with the comment "The quality of the input data can be characterized by the discrepancy ," (page 26869 ,line 17). In my opinion the discrepancy is a measure how well the inversion could perform for the specific input data set, i.e. how accurate it can reproduce these data. The error of the input data set itself cannot be directly estimated by this parameter.

It is true. Low discrepancy is necessary condition for retrieval, but not sufficient. Low discrepancy can't guaranty that data are free of errors. However high discrepancy can mark the regions, where retrievals make no sense. And this is how we used it.

3. Therefore I would like to know and it should be stated how the error of the input parameter can influence the inversion. Later it was briefly stated that the error of the extinction coeff. at 532 nm leads to oscillations in effective radius. However, the order of magnitude is not stated. This should be done to estimate the uncertainty of the effective radius retrieval at high temporal resolution.

The detailed study of influence of errors in every input optical coefficient was presented in our recent publication (Pérez-Ramírez et al., 2013). So we just provide the reference. 10% error in extinction at 532 nm leads to uncertainty in effective radius estimation up to 20%. Basing on our previously performed numerical simulations we estimate the uncertainty of particle volume and effective radius retrieval to be below 30%.

4. In addition with respect to this topic, the authors assume the uncertainties in the input

data as independent but also mention the influence of the overlap function on the retrieval (page 26870, top). The influence of the overlap function however influences all input data similarly and thus the uncertainty with respect to the overlap is not independent, right? Is the made assumption thus still valid?

We didn't make retrievals at heights where overlap was not complete, because it affects backscattering and extinction coefficients in different way. During prolonged lidar operation the system alignment could change leading to some increase of overlap height. Such data are normally characterized by enhanced discrepancy at low heights and are removed from consideration.

5. I would be very happy to see also high-temporal resolution panels of lidar ratio and Angström exponent as they are more or less used for the inversion, too.

We provided time-averaged profiles of the lidar ratio and Angstrom exponent. The quantitative retrievals are made for these time-averaged profiles. High-temporal resolution panels are mainly illustrative, so we think there is no reason to provide such panels for lidar ratio and Angström exponent.

Specific comments:

6. 26866, 16 "values" at wrong location in sentence?

It looks like location is correct.

7. Figure 2: Again, overlying borders would help a lot to understand the images.

Borders are added

8. Figure 8: Are there also error bars for the lidar ratio at 532 nm?

For these time- and range-averaged profiles the uncertainties for both wavelengths we estimate to be the same +/-15%, so we show it for only one wavelength.

9. Figure 9: Please explain in caption which Angtröm exponent is shown.

One curve was lost in this figure. Corrections were done.