

We thank the reviewers for their suggestions, which certainly helped us improving the manuscript. We tried to account for many of the points which are listed below in the text. In the following the reviewer's comments are presented in italics, the author answer with normal letters in blue and the modifications on the manuscript with bold blue letters.

Anonymous Referee #3

I think the paper can be publishes after minor revisions.

Comments: Not sure that this fig.2 is really necessary. The plots are too small to see details and information from this figure is not used for analysis.

Figure 2 is being discussed in section 2.1 where the measurement site is described. We would like to keep the figure because we believe that in this way the dominant source of biomass burning is presented in a better way. However, we agree with the reviewer that the plot is small to see details and for that reason we change the structure of the Figure in the revised manuscript.

Fig.3 doesn't present much information. May be it is better just to show vertical profile of backscattering instead?

Thank you the reviewer for the comment. The plot indeed doesn't give much information. Figure 3 has been deleted from the revised manuscript. The basic information of the figure is given in the text and we also provide the link where the temporal development of the range corrected signals of all channels could be found. The vertical profile of backscatter is given in Figure 4 (previously number Figure 5)

For backscattering calculation at 1064 Klett method was used. The lidar ratios in this work present strong variation, so the used values of lidar ratio at 1064 should be discussed.

Thank you for the reviewer's comment. We have add a paragraph to discuss how the backscatter at 1064 nm is retrieved. **To vertically retrieve the backscatter coefficient at 1064 nm we use Fernald-Klett method (Fernald, 1984; Klett, 1981).** With this method the particle backscatter coefficient is derived applying a backward iteration starting at a chosen reference height. The method requires independent information on the lidar ratio and on the reference value of the particle backscatter coefficient. The cases analyzed here are night-time measurements and the retrieved backscatter at 1064 nm was also evaluated by the Raman method (Ansmann et al. , 1992) using also the signal from the Nitrogen Raman channel at the 607 nm.

p. 35248. Ln.17. "Model calculations show that a deviation from the spherical shape can efficiently increase particle backscattering: : " I think this statement is wrong. Nonspherical particles have no peaking in backward direction so backscattering is lower.

Thank you the reviewer for the comment. The statement is deleted in the revised manuscript

Fig.8. Text is very small, difficult to read.

The Text in Figure 7 (previously Figure 8) is enlarged in the revised manuscript.

Table 2. Angstrom exponent for biomass burning is 1.7, while for the mixture of biomass burning and desert dust is 2.0. It is strange, because big dust particles should decrease EAE.

Thank you the reviewer for the comment. The Ångström exponent for biomass burning is 1.7, while for the mixture of biomass burning and desert dust is 2.0. This lead to effective radius of $0.17 \pm 0.04 \mu\text{m}$ and $0.13 \pm 0.03 \mu\text{m}$ respectively. We should firstly note that in the revised manuscript the third aerosol type is referred to mixture state of aerosols in general and not to mixing of desert dust and biomass burning aerosols. According to trajectory analysis desert dust particles could have been transported on the measurement site but there is not enough proof of dust activation. Also, the influence of the industrial aerosols cannot be excluded. The effect of a continuous influence of industrial properties in our measurements and results could change the size (Ångström exponent) and shape(depolarization ratio) of our mixture aerosols. A new publication including the mixing of desert dust, urban aerosols and biomass burning aerosols during biomass burning period will follow in the near

future. The contribution of each of these aerosol types will be quantified using the information of particle depolarization ratio and a detail analysis on the size distribution and Ångström exponent will be discussed.

Lidar ratios for mixture of biomass burning and desert dust at 355 and 532 nm differ more than twice. It should be discussed.

Thank you for the reviewer last comment! The value of median lidar ratio at 355 nm **is wrong**. The mistake was done by copying the maximum value (90 sr, see also Figure 5 (previously Figure 6)) of lidar ratio at 355 nm instead of copying the median value (73 sr). The mistake is corrected in the Table 2 of the revised manuscript and the other numbers of the Table 2 were also checked.