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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Biomass burning events measured by lidars in EARLINET. Part II. Results and discussions" *by* Mariana Adam et al.

Anonymous Referee #2

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The manuscript is the second part of a broader series where long range transport and local biomass burning events are detected and characterized through EARLINET - ACTRIS lidar network observations in Europe.

Despite the importance of the subject under discussion, the paper is not introducing anything new at this stage compared with the other manuscript already published. Biomass burning events have been extensively characterized by lidar observations over the past two decades. This manuscript, at present, reads as a dull and sometimes hard-to-follow laundry list of individual biomass burning events distinguished by some ambiguous set of common characteristics. Instrument networks are of fundamental importance to monitoring aerosol optical, geometrical and microphysical characteristics, and thus measurements and results cannot be reduced to such trivialization. The

paper is further missing compulsory context, as in who is going to benefit from these observations and how the article improves our knowledge on the subject? Taken as a whole, the paper is more of a technical report that important contribution to the literature. The paper does not, therefore, clear the bar for advocacy of publication and need major revisions before publication.

In the manuscript, it is often cited that the increase in lidar ratio is linked to a higher absorption of the aerosols. The authors cannot assume that the size distribution is unchanged? It would be very interesting to pair lidar data with AERONET observations for a case study. The synergy among the two instruments could help to better characterize the microphysical elements in these events.

The manuscript even if "Part II", should be able to stand alone. The majority of the acronyms are not defined and left to reader interpretation.

Specific comments are found in the attached file.

Please also note the supplement to this comment:
https://acp.copernicus.org/preprints/acp-2020-647/acp-2020-647-RC2-supplement.pdf

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Atmospheric Chemistry and Physics Discussions

Biomass burning events measured by lidars in EARLINET. Part II. Results and discussions.

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Abstract. Biomass burning events are analysed using the European Aerosol Research Lidar Network database for atmospheric profiling of aerosols by lidars. Atmospheric profiles containing forest fires layers were identified in data collected by fourteen stations during 2008–2017. The data ranged from complete data sets (particle backscatter coefficient, extinction coefficient and linear depolarization ratio) to single profiles (particle backscatter coefficient). The data analysis methodology was described in Part I (*Biomass burning events measured by lidars in EARLINET. Part I. Data analysis methodology*, under discussions to ACP, the EARLINET special issue). The results are analysed by means of intensive parameters in the following directions: I) long range transport of smoke particles from North America (here, we divided the events into 'pure North America' and 'mixed'-North America and local) smoke groups, and II) analysis of smoke particles over four geographical regions (SE Europe, NE Europe, Central Europe and SW Europe). 24 events were determined for case I). A statistical analysis over the four geographical regions considered revealed that smoke originated from different regions. The smoke detected in

Fig. 1.