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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Microphysical characterization of long-range transported biomass burning particles from North America at three EARLINET stations" *by* Pablo Ortiz-Amezcua et al.

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The authors thank the reviewers for the efforts, time and the thorough review of our manuscript. Please, find below a detailed response to the reviewer's comments.

General Comment: The authors have done an excellent job putting together models, back-trajectories and lidar data to retrieve microphysical properties of BB aerosols transported over the Atlantic ocean. I am glad to see that my initial comments were taken into consideration, and I particularly like the new Table 3 with all the trans-Atlantic BB plume measurements in Europe. I agree with the publication of this manuscript after

the authors address / reply to just a few minor comments below.

P.2 L.7-9: I've suggested the authors to give credit to the original papers about vertical transport of BB aerosols, and I see that the authors simply included all the example articles that I mentioned. These are far too many. Please keep only those most relevant to your discussion.

Answer:

We gratefully accept the suggestion and keep just the papers more related to the information we want to demonstrate in the new version.

P.6 L.20: In fig.3 I agree that one can see that the layer is somewhat decoupled from ground. However, since you looked at the LCL from the nearest radiosonde, and this is below the aerosol layer height, please say that too. It only makes your argument stronger.

Answer:

In the new manuscript version, we include the reference to the nearest radiosonde at Legionowo in order to make our argument stronger, as suggested. We included "This layer was decoupled from the aerosol layer near to the surface, as it can be seen in Fig. 3, and was over the Lifted Condensation Level (LCL) according to nearest radiosonde at Legionowo (http://weather.uwyo.edu/upperair/sounding.html)." (pp 7, lines 1-2 new version)

P.7 L.5: The authors looked at their backtrajectory results in figure 4 (where one can see a few trajs that reach near ground) and argued that this is a proof "that the relevant air masses came from superficial layers (...)". To my understanding, the fire power at ground level is strong enough to inject the BB at high altitudes. This is exactly why the atm-chem-models must have a plume-rise parametrization to calculate the injection height for each fire, otherwise they get the transport completely wrong. If the authors have evidence that the smoke they observed should be comming from ground level

(vegentation type? smoldering instead of flamming? something else?), they should present and discuss it.

&

P.8 L.11-13: Here the authors discuss figures 5, 6 and 7 which show that over the source (Canada and USA) the altitude of the smoke plume reaches up to 5km (see transects 1, 2, 8 and 9). This gives further confirmation of my previous comment. Over the source, you have smoke up to 5km, not just close to the ground.

Answers:

We fully agree with your considerations about smoke plumes injection height, and thus we changed the word “superficial” in the manuscript to avoid misunderstanding. Figure 5: Please mind color-blind or short-sighted readers, and change the green color to something that gives more contrast over the color used for the continents.

Answer:

We changed the green color to purple.

Figure 8: Please say (caption or text) how you selected which values to show. Are you masking out values when beta or alpha are lower than some threshold value? which?

Answer:

In text (pp. 10, lines11-12) we say that “The regions of profiles affected by incomplete overlap and by too low backscatter ratio are not shown”. In particular, we avoided regions with backscatter coefficient less than 0.2 x 10-3 km-1sr-1.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-946, 2016.

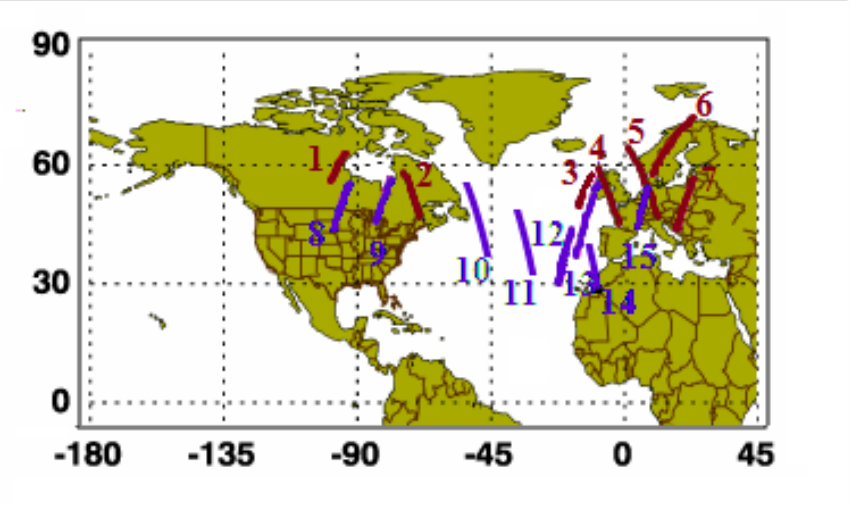

Fig. 1. Figure 5