

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

### **Anonymous Referee #3**

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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

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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.

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.

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 coming from ground level (vegetation type? smoldering instead of flaming? 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.

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.

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?

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