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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the vertical distribution of smoke in the Amazonian atmosphere during the dry season" *by* F. Marenco et al.

Anonymous Referee #1

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This paper describes a dataset of lidar profiles obtained by the UK research aircraft over Amazonia during the burning season, and compares the measurements with predictions from two forecast models. The paper is clearly written, the analysis is sound and the results are of sufficient interest to be published in ACP (although I hope the authors will use this dataset for a more in-depth interpretation than is given here). I have only minor comments on the paper.

Probably my most major comment concerns the figures, which although well prepared are mostly too small for publication. In most cases they needed zooming in on the screen which makes the paper painful to read. Axis labels and legends are generally

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unreadable in a printed copy, and should be increased in size relative to the figures. Figures 7 and 9 are examples which work well and the authors should make the other figures as legible as these.

p. 31747 l. 22. Could you show the reference heights on the figure? I had to check Marenco (2013) to understand what this paragraph was saying.

p. 31749 l.1-3. This is an example (for 741) where I had to zoom in a long way to see what the text was referring to.

p. 31754 l.8-13. Here it is argued that on flight 734 the lidar measured an elevated layer which is captured by the ECMWF model but not the UM. I don't agree with this. The measured layer is at around 3 km, whereas in the MACC model the elevated layer is around 6 km. The UM however does have elevated aerosol around 3-4 km. Is the presence of cloud in the UM the problem here? The authors need to be more careful in describing exactly what they are comparing.

p. 31755 l. 2. Looking at the figures there seems to be a much bigger extinction in the UM than in the measurements, not 'slightly'.

p. 31757 l. 12 'were found' rather than 'have been found'

p. 31757 last paragraph. There needs to be a more in-depth discussion of the model comparison. All that is said here is that the models got some things right and others wrong, which is a very superficial conclusion. Firstly, how good do the models need to be? They are never going to capture the details of every fire, so what is the aim of the model simulations? Secondly, are there significant systematic differences between the lidar and the models, and if so can we say why? Thirdly, can these lidar data provide guidance on where the models need to be improved?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 31739, 2015.