Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-9-RC1, 2016


Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "The evolution of biomass-burning aerosol size distributions due to coagulation: dependence on fire and meteorological details and parameterization" *by* K. M. Sakamoto et al.

**Anonymous Referee #2**

Received and published: 8 March 2016

This paper investigates the influence of coagulation on the particle number size distribution, notably on the mean diameter (Dm) and geometric standard deviation (Sigma) of a single particle mode, in biomass burning plumes. The work is based on a large number of sophisticated model simulations. The authors investigate how Dm and Sigma evolve with time in biomass burning plumes, and how their evolution is related to several parameters associated with primary particle emissions, fire conditions and atmospheric conditions. The authors compare briefly the influence of coagulation to that caused by organic aerosol formation/loss in a plume. The authors finally parameterize their results to a form that is applicable in large-scale modeling frameworks.



Printer-friendly version

Discussion paper

The is scientifically sound and orginal. The text is well organized and easy to read (with a couple of minor exceptions mentined below). The authors are able to exlain very well the numerous results obtained from model simulations. I have only a few minor suggestions for revisions.

Scientific comments:

I have a hard time of understanding Figure 3, even after reading the text on lines 210-213. I recommend that the authors work a bit more to make their message here clearer to readers.

Lines 254-255. The authors state that the initial mode mean diameter have little effect on Dm. I do not get this point when looking at Figures 4a and c: if Dm is initially large, it seems to typicaly lead to higher values of Dm at later plume times compared with cases when Dm is intially small. Could the authors specify what they mean here?

Line 390: Is this correct? Condensation of a non-volatile vapor into a single mode tend to narrow this mode, not widen it, as stated here.

The authors analyze shortly the influence OA production/loss on their results (section 3.5), and discuss also the potential effects of cloud processing (lines 463-469). This is clearly sufficient for these two processes in this paper. However, the authors do not mention at all new particle formation (NPF) that has been estimated to be a frequent process in biomass burning plumes. NPF might have notable effects on aerosol size distribution, and thereby on both Dm and Sigma, in evolving biomass burning plume. The authors should spend at least a few lines on discussing the relevance of this process in biomass burning plumes and on the potential effects of NPF on their results.

Technical issues:

Line 265: Figures 5 shows Sigma versus Dm rather than Dm versus Sigma.

Line 382: "..OA has been. . ."

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-9, 2016.



Printer-friendly version

Discussion paper