Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-248-RC1, 2016
© Author(s) 2016. CC-BY 3.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of mixing state and hygroscopicity on CCN activity of biomass burning aerosol in Amazonia" *by* Madeleine Sánchez Gácita et al.

Anonymous Referee #1

Received and published: 23 June 2016

Study by Gacita et al investigate hygroscopicity and mixing state influence on CCN activity of biomass burning aerosol in Amazonia using own adiabatic rising air parcel cloud model. Main aim is to assess effect of using various parametrizations of biomass burning aerosols in modelling CCN activation.

Main results of this study are: 1) use of the Kp for continental and biomass burning aerosol elsewhere can result in large overestimation of CCN over Amazonia. 2) Mixing state assumptions play less significant role 3) Kinetic limitations are not important. But they are lost in a long text full of detail information. On my opinion the manuscript can be reduce to a "letter" type of article.

Overall it is a valuable study on an important subject, but in a form as it is presented, it

is a numerical exercise based on synthetic input loosely linked to observations and with limited impact and link to reality. Study on nearly the same subject done by Roberts et al (JGR, Vol 108, 2003 doi:10.1029/2001JD000985) is not used and referenced at all and it can provide good observational and modelling basis for the sensitivity study in current manuscript, especially with respect to uncertainty, variability and error analysis.

I cannot recommend the manuscript for publication in its current form and would like to encourage authors towards a better manuscript appropriate for publication in ACP.

Detail comments:

Chapters 2.1 -2.3 covers summary of basic textbook equations reported in numerous publications in past. I suggest to move these chapters to Appendix or Supplementary material and reduce it with proper references to paragraph or two in paper itself.

Chapter 3 should be reduced significantly. It is not aim of this paper to make an overview of the past experiments. Data from each experiment used in this study can be properly referenced and briefly described in one paragraph. Chapter 3.1 is irrelevant for this study and should be removed completely. Chapter 3.2 should be significantly reduced and combined with paragraphs describing individual experiments, which provided observational basis for this study.

P1L23: why original reference to Köhler paper from 1936 is not included?

P15 L24-26: underestimation with respect to what? External mixing state?

P16 L1: overestimation with respect to. . ..?

P16 L15-25: How close to reality are selected externally and internally mixed fractions? It is not clear to me if it is based on observational evidence or just assumed for test purposes.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-248, 2016.