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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Biomass burning CCNs enhance the dynamics of a Mesoscale Convective System over the La Plata Basin: a numerical approach" *by* Gláuber Camponogara et al.

Anonymous Referee #2

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This article describes a modeling study of aerosol impacts on an MCS, using a case study in the La Plata Basin of South America. This is an interesting region to study aerosol impacts, as very strong convection tends to occur here, and it can also be greatly affected by the burning season in the Amazon. Convection in South America has been studied more and more lately, and this work has the potential to add some interesting considerations with regard to the effect of aerosols on storm dynamics. However, I felt the results presented were fairly superficial and did not examine any dynamics specific to the structure or organization of an MCS. I would consider accepting this paper for publication if some effort were put into further analysis.

1) The authors spend some time describing the features of an MCS in the introductory text, and then touch on none of them during the analysis and discussion. For example: there is a description of previous work on cold pool vs. shear dynamics, yet aside from a quick plot of buoyancy, the authors didn't examine how the actual storm organization changed with increased CCN. Were the cold pools deeper, colder, more widespread? Did this affect the longevity of individual convective cores or help to promote the growth of new ones? Could any difference be seen in the shape/tilt of the updrafts with a different shear/cold pool balance?

2) Most of the results were presented as domain averages, which leaves out a lot of details. The particularly interesting thing about an MCS is its complex structure, and averaging over all of this may gloss over important features. It would be quite useful, for instance, to know if any notable difference occurs in the storm anvil vs the convective core, or between convective and stratiform precipitation.

3) The calculation of updrafts used in Figs 8,15 are not explained well. Are you considering an 'updraft' as a core consisting of multiple model columns? It is not clear how Fig 8 A and B are different. More analysis of the behavior of updraft cores would be beneficial, but the authors need to be clear in their definitions.

A few suggested references:

Clavner, M., L. D. Grasso, W. R. Cotton, and S. C. van den Heever, 2017: The response of simulated mesoscale convective system to increased aerosol pollution: Part II: Derecho characteristics and intensity in response to increase pollution, Atmos. Res., In Press, http://dx.doi.org/10.1016/j.atmosres.2017.06.002

Fan, J., D. Rosenfeld, Y. Ding, L. R. Leung, and Z. Li (2012), Potential aerosol indirect effects on atmospheric circulation and radiative forcing through deep convection, Geophys. Res. Lett., 39, L09806, doi:10.1029/2012GL051851.

Saleeby, S. M., S. C. van den Heever, P. J. Marinescu, S. M. Kreidenweis, and P. J.

DeMott (2016), Aerosol effects on the anvil characteristics of mesoscale convective systems, J. Geophys. Res. Atmos., 121, 10,880–10,901, doi:10.1002/2016JD025082.

Seigel, R.B. and S.C. van den Heever, 2013: Squall-Line Intensification via Hydrometeor Recirculation. J. Atmos. Sci., 70, 2012–2031, https://doi.org/10.1175/JAS-D-12-0266.1

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