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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.

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We thank the referee for the criticism and suggestions that have help us improve the paper.

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

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Discussion paper

of new ones? Could any difference be seen in the shape/tilt of the updrafts with a different shear/cold pool balance?

Dear referee, we have isolated the cold pools in order to examine the aerosol impacts on them. Unfortunately we have had several problems in isolating them due to the complexity of the simulation:

- The model grid spacing is 2.5 km. We believe that it would be easier to isolate the cold pools in finer grids;
- The topography of the domain is complex thus upslope and downslope circulation combine with cold pools and confounding the distinction between the two.
- The horizontal temperature gradient was quite strong due to a cold front approach, thus making it hard to distinguish the effect of the cold pool.

The automatic cold pool localization did not converge due to these reasons. This will be an issue for future research.

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.

Thank you for the suggestion. We have computed and included in the paper the ratio between convective and stratiform precipitation in order to show with more detail features about MCS's 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.

We appreciated your suggestions. We have improved the text in order to make it clear.

The changes are highlighted.

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