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Interactive comment on "A single-column particle-resolved model for simulating the vertical distribution of aerosol mixing state: WRF-PartMC-MOSAIC-SCM v1.0" *by* Jeffrey H. Curtis et al.

Anonymous Referee #2

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Curtis et al. presents the development of a single-column particle resolved model to simulating vertical distribution of aerosol. The method used in this study is solid and the paper was properly written. I recommend its publication after my following comments are addressed. Comments:

1. Vertical transport is more generally used to represent vertical movement and distribution of aerosols. But not only turbulent diffusion and dry deposition affect vertical distribution, why only they are considered?

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Discussion paper

2. WRF already has vertical transport schemes. Why this study uses new and different equations when WRF is coupled?

3. WRF has Asymmetric Convective Model, version 2, (ACM2) to include both an eddy diffusion scheme and the nonlocal scheme to better represent the rise and fall of the convective boundary layer. Has this been considered in this model?

4. The abstract is rather simple. Only what have been done were presented but no results were shown.

5. If aerosol mixing state is used to refer distribution of chemical species. Then, all current models are able to and predicting aerosol mixing state. What makes this study different? Mixing state is better used for how particle components are distributed in each particle, homogeneous, core-shell or else. But it is not discussed in this study.

6. Too much detailed information in sections 2 and 3. They should be greatly reduced by put information to appendix. Very less readers would be interested in the algorithms.

7. Point source emissions are important in vertical distribution calculation of particle? Why this study did not consider that? How would that change the results?

8. The tested case only shows the concentrations of PM components. It is not clear how mixing state is changed or simulated as the title emphasizes it.

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