Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-526

Ben Kravitz (Referee)

Referee comment on "Dependency of the impacts of geoengineering on the stratospheric sulfur injection strategy – Part 1: Intercomparison of modal and sectional aerosol modules" by Anton Laakso et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-526-RC1, 2021

This is a great study, and important. This has needed attention for some time. I am recommending minor revisions.

I'd like to see the conclusions fleshed out a bit more. What have we learned about best practices for simulation? When is it okay to use a modal model versus a sectional one? I'd like to see some insight that people in the field can use.

I found numerous typos, LaTeX issues, and other errors at the word and sentence level, both in the text and figures. Another round of proofreading (or having ACP do copyediting) would be useful.

I found the description on lines 241-248 confusing. You first attribute the difference between the studies to different LW treatments, then the optical properties, and then the different size distributions. Which is it and how do you know?

Line 267: I see four modes in Figure 2, so it's not obvious to me which one you're calling the accumulation mode. I'm guessing the second-largest one, since that would fit with small changes in number concentration?

Line 268: How does the coarse mode change in size? That capability/feature seems like it should be mentioned in Section 2 in your description of M7.

Line 270: You could quantify "considerably different" by integrating the area under the pink curve that falls within the coarse mode.

Lines 275-276: As written, this is kind of a throwaway claim. You have to show that this matters if you're going to claim it. Same comment for lines 467-468 and line 500.

Lines 291-297 (and also section 3.2): So which one is right? My guess would be that SALSA is closer to the truth (although certainly not perfect), and I acknowledge that this is hard to verify based only on Pinatubo, but I'd like to see you talk more about this.

Lines 618ff: True, for equatorial injection (as you say later).