Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-516-RC1, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Connecting regional aerosol emissions reductions to local and remote precipitation responses" *by* Daniel M. Westervelt et al.

Anonymous Referee #1

Received and published: 27 June 2018

Review of Westervelt et al. acp-2018-516

This is a high quality paper. The study is clean, thoroughly done, and I learned something. Bravo. I have a few minor comments.

Your final section is much heavier on the summary and pretty light on the conclusions. What else can you say about how this study fits more broadly into the scientific literature?

One important point about your analysis is that you did the step changes one at a time, which doesn't tell you about nonlinearity. I don't think you need to do any additional simulations, but it would be useful for you to comment (insofar as you're able to do so)

about additivity of the perturbations, or lack thereof.

The fact that GISS-E2-R didn't include aerosol indirect effects is interesting in the light of Malavelle et al. (2018) [https://www.nature.com/articles/nature22974]. The conclusion from that paper is that the first aerosol indirect effect is far more important than the second one. This of course doesn't mean that GISS is "right", and the other two models are "wrong", but a comment may be in order.

The mechanism you invoke reminds me of a few papers: https://www.nature.com/articles/nclimate1857 https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2014RG000449 https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2015GL066903 All three of these support your mechanism (especially the first one) and might be useful to reference if appropriate.

One thing you don't mention about Sahelian rainfall is the character of the rain. Mean changes could indicate more extreme events. I don't know if this is relevant or if you can comment on it, given the scope of the study, but I thought I'd mention it.

Your discussion of Mediterranean precipitation changes is something of a counterpart to this paper: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2017GL076669 I don't think you need to do anything to address this comment – just something interesting that occurred to me.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-516, 2018.