Comment on acp-2022-97
Anonymous Referee #2

Referee comment on "The Dependence of Aerosols’ Global and Local Precipitation Impacts on Emitting Region" by Geeta Persad, Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-97-RC2, 2022

This paper by Geeta G. Persad shows how precipitation response depends on aerosol emission regions. The paper is well written and the topic is relevant for the community.

Author use CESM2-CAM5 model with slab ocean configuration. Experimental setup consists of 8 regions where the author has changed regional emissions to correspond to China's emissions from the year 2000. Author clearly shows how the fast and slow precipitation responses depend on the emissions regions, and discusses thoroughly on the mechanisms behind the changes.

Major comments

The role of natural variability is not discussed. As the runs are equilibrium runs, the year-to-year variability can be used as an estimate for natural variability. Are the results significant compared to year-to-year variability.

How do these results compare to other similar experiments with other models? Example PDRMIP regional experiments

minor comments:
Figure 2. Lack of explanation for the black lines

Figure 1, figure 6, figure 5. It is somewhat hard to read where the precipitation change is significant when the statistical significance is indicated via gridlines. Maybe change to dots?

Figure 3. Lack of explanation for the black lines

Lines 150-155. Here author list different feedbacks due to sea surface changes. I would like to see also how this is limited by the slab ocean configuration

line 115-120, 145-146: Change word couple to slab ocean, to indicate that runs are not done with fully coupled ocean.

Figure 4a. should show also if the change is significant or not, example by hatching the squares.