

Interactive comment on “Distinct responses of Asian summer monsoon to black carbon aerosols and greenhouse gases” by Xiaoning Xie et al.

Anonymous Referee #2

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This study compares the influence of BC and GHGs on Asian summer monsoon based on the PDRMIP simulations, and the physical mechanisms that influence the responses are discussed as well. The topic is really interesting and the manuscript is well organized and presented, while I think the manuscript can be further improved by considering . I suggest the paper to be published after a major revision, and my specific comments are listed below:

1. Three sub-regions are defined for discussions, and dots with different colors are suggested to differ the three regions.
2. It is interesting and expected to find the uncertainties related to the $BC \times 10$ is larger than those of $CO_2 \times 2$, and would the authors give more discussions on the possible of the uncertainties?

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3. CMAP precipitation and the corresponding references should be given. Is there also precipitation in NCEP2, and why different “observations” are used in Figure 2 (even if the variables are different)?

4. I found Section 4 really interesting, and would really suggest the authors to extend the corresponding discussions. For example, the authors simply mentioned that “Our analysis suggests that there are obvious differences in the spatial distribution between BC and GHG-induced ERF, although both of them induce positive radiative forcings at the TOA” for Figure 8. How the differences are introduced, and how such differences would further influence the ASM? Maybe the spatial distributions of BC and CO_2 concentration differences introduce the differences. Thus, I suggest to include the BC and CO_2 concentration distribution in the figure as well. This is not directly related to this study, but may be helpful to better understand the forcing. Meanwhile, I noticed that there are some regions with negative forcing, and how such forcing is introduced?

This is just one example, and I suggestion the section to be discussed in more details. However, this is just my personal suggestion, and it is totally up to the authors’ choices.

5. The spatial variations of the variables should be better discussed. Maybe the standard deviation over space can be discussed and given as well.
6. $SO_4 \times 5$ is used, whereas, for the ASIA case, the $SO_4 \times 10ASIA$ is considered, which makes the comparison less meaningful.
7. Labels for the markers should be given in Figure 13(b)

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