We are grateful to the reviewer for their interest and comments on the paper. These comments are very valuable and have helped improve the manuscript. Here we outline how we have addressed these comments in the revised manuscript. The newly added discussions and rephrased sentences have been highlighted in green in our replies below.

The authors conduct coupled ocean atmosphere and fixed SST aerosol simulations with the CESM, focused on 1970-2010 emission perturbations due to changes in en-ergy growth and advances in emission controls. The latter is associated with a neg-ative ERF, global cooling and reduced precipitation. The former is associated withthe opposite responses. Regional impacts are also discussed, as is the non-linearity of the responses, and the limitations of using the ERF to diagnose aerosol tempera-ture/precipitation responses.
Overall, the paper is well written, and the experiments and results are clearly presented. From my perspective, the result emphasized in the title of the manuscript isnot that surprising (at least qualitatively). What appears to be most interesting is the significant amount of non-linearity in the responses. As discussed, this has important implications for experimental design to quantify aerosol climate responses, and also reinforces the difficulty in quantifying future aerosol-climate impacts.

Specific Comments
1. Figure 1. A bit confusing for BC. Is the BC ERF also increased by a factor of 10? I assume no (which is confirmed by the text), but the panel label shows "BCx10".

We thank the reviewer for pointing this out. Indeed, BC ERF is not multiplied by 10. We have modified the Figure with the label changed to "BC".

2. Section 2.2. Please include information on CESM's aerosol forcing, relative to other models. For example, CESM has a relatively large aerosol indirect effect. Which will subsequently impact these results. Allen and Ajoku calculated the aerosol effective radiative forcing (ERF; (W/m^2)) for 2000 relative to 1850, from CMIP5 models using the sstClim and the sstClimAerosol experiments. CESM yields -1.52 W/m^2, which is one of the largest aerosol ERFs. See Table 1 in "Future aerosol reductions and widening of the northern tropical belt" JGR, 2016.

In combination with comment #3, we add the following sentences following P4 L26: "Note that CESM1 (CAM5) has a relatively larger aerosol forcing than other CMIP5 models, likely due to the large cloud adjustments through cloud water path in MAM3 (Allen and Ajoku, 2016; Malavelle et al., 2017; Zhou and Penner, 2017). In light of this and considering the overall uncertainties in the representation of aerosol effects, we underscore that all results and discussions below should be interpreted in the context of CESM1-CAM5."

3. Also, it is not acknowledged that these results are likely highly model dependent until the conclusions (L21 P11). I suggest making this point earlier in the manuscript (as well as in the conclusions).

Please refer our reply to comment #2

4. P8 L15. See also “A 21st century northward tropical precipitation shift caused by future anthropogenic aerosol reductions” JGR 2015.

We thank the reviewer for pointing us to Allen (2015) which is cited in the revised manuscript.

References

Allen, R. J. (2015), A 21st century northward tropical precipitation shift caused by future anthropogenic aerosol reductions, Journal of Geophysical Research: Atmospheres, 120(18), 9087-9102.

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Malavelle, F. F., J. M. Haywood, A. Jones, A. Gettelman, L. Clarisse, S. Bauduin, R. P. Allan, I. H. H. Karset, J. E. Kristjánsson, and L. Oreopoulos (2017), Strong constraints on aerosol–cloud interactions from volcanic eruptions, Nature, 546(7659), 485.

Zhou, C., and J. E. Penner (2017), Why do general circulation models overestimate the aerosol cloud lifetime effect? A case study comparing CAM5 and a CRM, Atmospheric Chemistry and Physics, 17(1), 21-29.