We thank the reviewer for thoughtful and to-the-point comments that definitely helped us to improve the manuscript.

Anonymous Referee #2
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This paper reports results from a study of radiative-convective equilibria with varying aerosol burden. The study is novel in that it considers aerosol indirect effects in 3D simulations of resolved deep convection with both fixed and interactive SST. The inter- active SST case is relevant to the climate problem, and the paper shows that changes in SST can strongly affect the precipitation response (as might be expected). Although the setup is very idealized and the paper is mostly descriptive, the results are interest- ing because they address the important question of how microphysical effects may be countered by adjustments in the atmosphere or in both the atmosphere and SST. The paper is also useful for its descriptions of how cloud water/ice and various hydromete- ors change in response to the combined aerosol and SST changes. I recommend that the paper be published after some (mostly minor) revisions.
—————— Specific comments:

page 29104 line 20: It should be stated here that statistical equilibrium is not reached in these simulations (e.g., Figure 1)

page 29105 line 25: Climate sensitivity could differ in RCE compared to the tropics because of the effects on humidity and clouds of large-scale circulations and convective organization more generally. It would be helpful to add this caveat.

Actually that caveat has been already in the original manuscript (see the very last paragraph of the text).

page 29107 line 20 and 29112 line 21: The paper says that "precipitation decreases in response to a drying atmosphere". However, the sign of the change in global or domain mean precipitation does not have to be the same as the sign of the change in precipitable water (this is clear, for example, in the response to black carbon). Instead the change in precipitation may be related through the atmospheric energy budget to changes in radiative fluxes at the surface and TOA (and also the surface dry sensible flux). Note that changes in surface fluxes can be as important as the changes in OLR discussed in the paper.

Good point and certainly true. The phrase *"precipitation decreases in response to a drying atmosphere"* was replaced by "the precipitation decreases following the reduced radiative cooling of the atmosphere…"

page 29108 line 24: The paper mentions that the changes in cloud fraction may not be statistically significant. It would be worthwhile to check this by using a statistical test or by adding some uncertainty estimates. The text (page 29106 line 20) concerning the radiative effects of changes in cloud fraction should be modified accordingly.

The changes in cloud fraction for the fSST case (about 1.5-2%) is consistent with other changes. We added a plot of the liquid effective radius which clearly demonstrates the dominance of the first indirect effect in the overall indirect effect (decrease of the effective radius by about the factor of 2 while increasing the liquid water path only by 20%), therefore, the small change in cloud fraction, which constitutes the second indirect effect is not crucial for our argument. In fSST case, the increase of OLR with increase of CCN by about 1.5% is consistent by reduction of the high-cloud cover by about the same amount. In iSST case, the overall decrease of OLR with increase of CCN is mostly due to cooling of the whole column and corresponding cooling of the cloud tops following the reduction of the SST. The phrase mentioning statistical significance has been modified.

page 29109 line 7: The discussion of the changes in precipitation fluxes and cloud ice and water is generally reasonable, but more could be said about why cloud ice amount decreases when more water is transported above the freezing level (and perhaps com- pare with the discussion of Morrison and Grabowski 2011 in this regard).

We agree that the manuscript was not clear enough on this issue. We hope that the edited version given below is more clear:

"Higher cloud liquid water content means more water transported above the freezing level, which means more water is available for the cold-phase precipitation processes. This explains the monotonic increase of snow (Fig. 5d) and graupel (Fig. 5e) water paths and the corresponding decrease of the column cloud ice (Fig. 5b) as the result of accretion by the frozen precipitation."

page 29112 lines 2-7: This part of the paper is confusing. It seems to imply that the >reduction< in longwave cloud radiative forcing in the ISST case is due to the decrease in >clear-sky< greenhouse effect. Since this paper deals in part with the difference between slow and fast responses and the role of radiative constraints on precipitation, it would be helpful if it made a stronger connection to the wider literature on these subjects (e.g., Mitchell et al, QJRM, 1987; Bala Clim Dyn 2010).

Those are the GCM studies. There is a huge pool of publications in this general area involving the GCMs, but the scope of our paper is much more limited.

———————— More technical comments:

page 29102 line 10: The text gives the impression that Rotstayan and Penner 2001 and Rotstayn and Lohmann 2002 are previous CRM studies of AIEs, but these studies used GCMs.

Thanks for catching that. Those two references were removed from that paragraph, and reference to van den Heever (2011) has been added.

page 29104 line 15: According to the text, the same constant oceanic energy flux is used in all simulations. The value of this flux should be stated.

The insolation was chosen such that no q-flux was needed in the control case as the net surface flux is within 0.5 W/m2 from the perfect balance (see Fig. 3f). The confusing peace of the manuscript in the case-setup section has been edited.

equation 1: Make explicit that the log is base 10.

done.

page 29107 line 3: The paper states that "both estimates are quantitatively consistent with the results of Menon 2002", but the numbers given don't seem to support this for the FSST case.

We made that notion explicit in the text.

Figure 1: The IA2CO2 and IA200 lines are not easy to distinguish (at least with my color printer!). Perhaps putting IA2CO2 at the top of the legend (consistent with the vertical ordering of the lines) would help, or using a line with additional symbols (e.g., squares) for IA2CO2 to better differentiate it from the other lines.

Fig. 1 was replotted using different colors as well as alternating solid and dashed lines.

Figures 3,5,6: Depending on how the journal deals with these figures, they may be quite difficult to read given the number of panels and font sizes. Increasing the font sizes may help.

Figures have been redone. Note that a new Fig. 6 was added. The old Fig6. became Fig.7. The font sizes have been increased. Hopefully, the figures are more suitable for publication.