Review on “How Asian aerosols impact regional surface temperatures across the globe” by Merikanto et al.

General:

This manuscript investigates the global temperature response to the removal of anthropogenic aerosol in S&E Asia, by running two global climate models coupled with the slab ocean. The novelty of this work is a decomposition of the global temperature responses into contributions from multiple energy components, which help to identify the sources of temperature responses to different physical processes. I think the manuscript is well-organized and neatly-written. The figures and tables are fully supporting the conclusions. Therefore, I would suggest accepting the manuscript after minor revisions on a few points for clarification.

Specific comments:

1) Line 64, Line 243, Line 402 and perhaps somewhere else

   “removal of South and East Asian aerosols”. I think this study removes ANTHROPOGENIC aerosols in S&E Asia, not ALL aerosols in S&E Asia. Please be more precise in the context.

2) Line 98:

   What is “indirect instantaneous aerosol radiative”?

3) Line 107-109:

What does the “natural background aerosol” exactly mean? Sulfate from DMS over ocean? Carbonaceous aerosols from natural sources such as wildfire? I think the species and brief info about sources of “natural background aerosol” or “background aerosol” should be specified at least.

4) Section 2.1:

As the manuscript focuses on surface temperature response to the radiative forcing of anthropogenic aerosols in S&E Asia. I would be curious about what the climate sensitivities of the two models are. Climate sensitivity is essentially related to water vapor feedback, cloud feedback and ice-albedo feedback etc. I think knowing the climate sensitivities of the two models would help the audiences better understand how sensitive the surface temperature is responded to different physical processes (especially the cloud-related process).

5) Line 183:

“such as to changes in atmospheric and surface temperature AND/OR? water vapor”

6) Line 237-241:

I do not get the point quite well here. What do you mean the “cancellation of differences in $\Delta$IRF”? Is it referring to Figure A1 that $\Delta IRF_d$ in ECHAM6.1 is stronger than that in NorESM1 but $\Delta$

$IRF_{id}$ in ECHAM6.1 is weaker than that in NorESM1. $\Delta$ IRF is obtained by summing up $\Delta IRF_d$ and $\Delta IRF_{id}$, thus $\Delta$ IRF in the two models have more similar distributions and has higher model-to-model correlation coefficient than $\Delta$ $IRF_d$ and $\Delta$ $IRF_{id}$ respectively. Is it correct?

7) Line 323-324:

Why does emphasize the similar cc for $SW_{cld}$+$LW_{cld}$ and for total cloud cover here? I see from Figs. 3A and 2E (Figs. 3B and A2E; Figs. 3C and A3E) that the distribution of total cloud cover is more similar to distribution of $LW_{cld}$, not the distribution of $SW_{cld}$+$LW_{cld}$. Is it correct?