

Interactive comment on “Technical Note: On the use of nudging for aerosol-climate model intercomparison studies” by K. Zhang et al.

Anonymous Referee #2

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This manuscript explores different nudging experiments using the Community Atmosphere Model. The manuscript is of significance to the modeling community given the decision to use these results as model guidance for the AeroCom aerosol-climate model intercomparison initiative. The general guidance is to nudge the wind field and not temperature as nudging towards temperature creates issues when trying to estimate aerosol impact on radiation and clouds. The manuscript also provides more general guidance to the modeling community. The manuscript is well written with very well designed experiments to investigate the impact of nudging while retaining estimates of the aerosol impact on the climate. A few minor changes and additions are recommended below.

1. The argument that nudging to temperature is a valid argument, but some additional
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explanations would be helpful. In particular, some of the largest temperature corrections for nudging (mid to high latitudes) do not coincide with the max. mean frequency of occurrence for homogeneous ice nucleation (tropics).

2. Figure 4 needs to be clarified. How is the frequency of occurrence being calculated? Is the frequency from daily model output? Would be helpful to have the color bar as a percent.

3. Figure 5 also shows largest sensitivity in the tropics but Figure 6 tries to justify using global average precipitation. It would be helpful to have a separate analysis on the tropics compared to the mid-to-high latitudes.

4. Figure 7: Clarify caption from “5 yr mean zonal mean temperature”.

5. Figure 8: Caption should include (U, V, T, Q, Z3).

6. There are a lot of studies working on regional application of aerosol impacts using limited area models. Should mention this application as it could be a great lead for future studies wanting to understand the impact of nudging of aerosols for regional applications.

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