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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Attribution of Chemistry-Climate Model Initiative (CCMI) ozone radiative flux bias from satellites" *by* Le Kuai et al.

Anonymous Referee #1

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Kuai et al. applied observational derived instantaneous radiative kernels to diagnose the source of biases in 9.6 um ozone-band radiative flux in an ensemble of chemistry-climate models. The result of the work is useful to guide efforts to improve chemistry-climate models and reduce the uncertainty in ozone RF estimates. The paper is in general well written. I recommend it for publication with a few minor comments.

The paper considers only clear-sky conditions as stated in page 3 line 28. Effect of cloud is not studied. Mention this in the title and abstract to avoid confusion.

Some details about how IRKs are computed can be useful. For example, how you compute deltaL/deltaq term in eq. (2)? Does this computation relies on prior information about vertical profiles of ozone, water vapor, Ta, and Ts? If so, how do they compare to the reanalysis used in this study or if any biases will impact the values of IRKs?

Eq. 3. Should there be some kind of layer thickness operator in eq.3? Model layers with different thickness should be weighted differently.

Page 6 Section 3: If I understand correctly, the model radiative flux bias is derived from eq (3) based on IRKs and the biases in O3, H2O, Ta and Ts. So how do these simulated ozone-band fluxes directly compare with satellite observations, e.g., figure 1?

Page 8 Line 10: complements

Page 9 Line 42: "while the absolute Ts bias has a larger than the Ts impact for most model". The sentence reads awkward and the second Ts should be Ta?

Page 10 Line 7-8: "negative global mean bias" and "biased low" are repetitive. Page 10 Line 21: the second Ta should be Ts? Page 14 Line 25-27,33-35: I do not understand the argument to explain the anticorrelation between o3 and OLR and no correlation between H2O and OLR.

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