

## ***Interactive comment on “Strong modification of stratospheric ozone forcing by cloud and sea ice adjustments” by Y. Xia et al.***

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Thank you for this highly interesting study on the efficacy of ozone radiative forcings.

In reference to the comment in your short summary concerning previous studies on cloud adjustments to ozone forcing (also discussed in section 1 of your discussion paper), please see the opposing clear-sky and cloud radiative long-wave effects of upper tropospheric and lower stratospheric ozone changes and high clouds in

- Nowack, P. J., Abraham, N. L., Maycock, A. C., Braesicke, P., Gregory, J. M., Joshi, M. M., Osprey, A., and Pyle, J. A.: A large ozone-circulation feedback and its implications for global warming assessments, *Nature Climate Change*, 5, 41–45, doi:10.1038/nclimate2451, 2015.

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Note in particular Figure 4 and the discussion on Supplementary Figure S6. Can you say more about the nature of the positive tropical ozone long-wave forcing you find?

You might further find the following studies interesting to compare to:

- Boer, G. J., Yu, B. Climate sensitivity and response, *Climate Dynamics*, 20, 415–429, doi: 10.1007/s00382-002-0283-3, 2003.
- Shindell, D., Faluvegi, G.: Climate response to regional radiative forcing during the twentieth century, *Nature Geoscience*, 2, 294–300, doi: 10.1038/ngeo473, 2009.
- Shindell, D. T., Faluvegi, G., Rotstayn, L., Milly, G.: Spatial patterns of radiative forcing and surface temperature response, *Journal of Geophysical Research: Atmospheres*, 120, 5385–5403, doi: 10.1002/2014JD022752, 2015. (and references therein)
- Stuber, N., Ponater, M., Sausen, R.: Why radiative forcing might fail as a predictor of climate change, *Climate Dynamics*, 24, 497–510, doi: 10.1007/s00382-004-0497-7, 2005.

Finally, you mention in section 2 the representation of coupling between wind stress and sea ice dynamics in the model. Do you know whether the choice of a slab ocean model as compared to a deep ocean model could affect dynamical atmosphere-ocean interactions? Out of interest, what part of the sea ice responses do you think is driven by the regional cloud forcings (in that sense the sea ice feedback and the regional cloud feedback are, as you say, partly related)?

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