

Interactive comment on “Effects of Arctic stratospheric ozone changes on spring precipitation in the northwestern United States” by Xuan Ma et al.

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A highly interesting study - just one question for clarification:

You decrease/increase the ozone climatology homogeneously by 15% in R2/R3, which will also amplify zonal inhomogeneity in the ozone climatology because already greater ozone mixing ratios will be increased more in terms of absolute magnitude. Several studies (e.g. Gabriel et al. 2007, Gillet et al. 2009, McCormack et al. 2011, Nowack et al. 2018) showed that such zonal asymmetry can be important for the Arctic vortex climatology and as a result surface climate. Do you have any means of determining the importance of the general increase/decrease in ozone imposed by you as compared

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to the amplification of the zonal structure, which might be particularly important for the vortex climatology? It would be great if you could put your results into context.

McCormack, J. P., Nathan, T. R. & Cordero, E. C. (2011), 'The effect of zonally asymmetric ozone heating on the Northern Hemisphere winter polar stratosphere', *Geophysical Research Letters* 38(3), 1–5.

Gabriel, A., Peters, D., Kirchner, I. & Graf, H. F. (2007), 'Effect of zonally asymmetric ozone on stratospheric temperature and planetary wave propagation', *Geophysical Research Letters* 34(6).

Gillett, N. P., Scinocca, J. F., Plummer, D. A. & Reader, M. C. (2009), 'Sensitivity of climate to dynamically-consistent zonal asymmetries in ozone', *Geophysical Research Letters* 36(10), 1–5.

Nowack, P. J., Abraham, N. L., Braesicke, P. & Pyle, J. A. (2018), 'The impact of stratospheric ozone feedbacks on climate sensitivity estimates', *Journal of Geophysical Research: Atmospheres* 123, 4630-4641.

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