Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-1237-SC1, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Variability of temperature and ozone in the upper troposphere and lower stratosphere from multi-satellite observations and reanalysis data" *by* Ming Shangguan et al.

Kris Wargan

krzysztof.wargan-1@nasa.gov

Received and published: 9 February 2019

Dear Authors

Please consider these two comments, one scientific and one regarding data citation. This is an interesting paper and I hope you will find my remarks helpful.

1) I really appreciate your discussion of the negative impacts of step-changes in the ozone observing system on ozone trends in MERRA-2. Even a cursory look at Figure 13 reveals that the discontinuity associated with the transition from MLS v2.2 to v4.2 in June 2015 is nontrivial, as you correctly point out in Section 3.4. I would like to draw

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your attention to the fact that it is possible and relatively simple to account for this, as well as the 2004 SBUV-to-MLS transition, precisely because these step-changes are so infrequent and well defined. In Wargan et al, 2018 (doi:10.1029/2018GL077406) we did it using an SD model simulation as a transfer function but it could also be done by including a step-function proxy in the MLR. We tried the latter approach (not shown in our paper) and the result was very similar to that obtained using the transfer function approach. I suspect the MERRA-2 panel in Figure 14 would look different if a bias correction was applied. In fact, the analysis could be extended further back to 1998.

2) NASA GMAO asks the users of MERRA-2 data to explicitly cite the data collections used. Note that each MERRA-2 collection has a unique doi number listed in the file specs document https://gmao.gsfc.nasa.gov/pubs/docs/Bosilovich785.pdf

For example monthly mean pressure-levels assimilated data ("M2IMNPASM" or *instM_3d_asm_Np*) could be cited as follows:

Global Modeling and Assimilation Office (GMAO) (2015), MERRA-2 instM_3d_asm_Np: 3d,Monthly mean,Instantaneous,Pressure-Level,Assimilation,Assimilated Meteorological Fields V5.12.4, Greenbelt, MD, USA, Goddard Earth Sciences Data and Information Services Center (GES DISC), Accessed: [Data Access Date], 10.5067/2E096JV59PK7

I hope this is helpful and thanks for using MERRA-2! Best regards, Kris Wargan

Reference Wargan, K., Orbe, C., Pawson, S., Ziemke, J. R., Oman, L. D., Olsen, M. A., et al. (2018). Recent decline in extratropical lower stratospheric ozone attributed to circulation changes. Geophysical Research Letters, 45, 5166–5176. https://doi.org/10.1029/2018GL077406

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-1237, 2018.