

Interactive comment on “Comparison of large-scale dynamical variability in the extratropical stratosphere among the JRA-55 family data sets” by Masakazu Taguchi

Anonymous Referee #2

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This is an interesting paper discussing the differences between 3 versions of the JRA reanalysis system; a standard version without assimilation of satellite information, a version with satellite information included, and a AMIP type version. The focus is on differences in stratospheric variability and in particular on differences in the number and the characteristics of sudden warmings.

The warmings are diagnosed both with the zonal mean wind at 60 N, 10 hPa and the geopotential height at 10 hPa giving the displacement and shape of the vortex.

The two versions with assimilation give very similar results although inclusion of the satellite data seems to increase the stratospheric variability somewhat. The AMIP type

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experiment, on the other hand, shows much less stratospheric variability and very few sudden warmings.

The English could be somewhat improved in places but otherwise the paper is clear and the conclusions well argued for. I will recommend that the paper is accepted after some relatively minor changes.

Major comments:

I think the summary and discussion should be expanded a bit. What does it mean for the quality of the reanalysis if the AMIP type experiment has too little variability? I guess you would expect that if the model was perfect then the statistics of the AMIP experiment would be similar to the statistics of the reanalysis. Do the results of this paper mean that we should expect the number of sudden warmings to be underestimated in the reanalysis products?

It is generally accepted that sudden warmings include some preconditioning. It could be the case that the general lower wave-forcing in the AMIP experiment leaves the vortex very strong so that even after a strong wave event we don't see a sudden warming. Perhaps this is discussed in the text with other words but I would like the authors to include the concept of "preconditioning".

Minor comments:

Perhaps the title could be more precise on what the paper is about. I would suggest that the words "reanalysis" and "assimilation" should be included in the title. Not everybody knows what the "JRA family" is.

p1, l15: This sentence is unclear.

p2, l16: "... will also be investigated". Does that refer to the S-RIP or the present paper?

p5, top: The degrees of freedom used in the statistical tests should be given. I guess you treat all months as independent. But this assumption at least requires some dis-

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cussion.

p11, l3: over 4 -> above 4

p17, l8 RMSE -> RMSD?

p5, l22: The sentence "The zonal wind at the gridpoints " does not make sense.

p5 l30: It should be made clear here that this sentence refers to a single event.

p6, l6: The difference in the widths of the pdf's is very small.

p6, l28: Why is there this linear relationship between AR and CL. It seems that if the displacement is large then the change in shape is large? Is this physically based or an effect of the way the parameters are calculated?

Table 1: Why is the AMIP experiment not in the table?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-299>, 2017.