

# **Review: Comparison of large-scale dynamical variability in the extratropical stratosphere among the JRA-55 family data sets**

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Atmos. Chem. Phys. Discuss.

June 8, 2017

## **Summary**

In this study, the author describes an interesting and novel analysis which compares large-scale stratospheric variability in the three datasets which make up the JRA-55 family. This means he can directly compare (mostly SSW) cases in the full data assimilation system and in the case with no satellite measurements and when there are no atmospheric observations at all. I have not seen anyone attempt this kind of analysis before, and it makes a very useful contribution to our understanding of stratospheric variability and SSWs in particular. That said, and while I think the paper should be published, I also thought that the paper failed to fully capitalise on the potential of the approach. I try to outline my major concerns below. Similarly, in its current form the paper is probably a little too long and could benefit from some careful editing to bring out the main results (and remove some of the current figures).

## **Major comments**

**Style** The paper takes a largely descriptive approach to comparing the datasets until section 6. I really was hoping that the author might incorporate a little more discussion throughout the manuscript, particularly when comparing the JRA-55 and JRA-55C datasets, since there is a great deal more that might be said about the differences here, particularly since they seem to be confined to the upper stratosphere and sometimes significantly influence the timing of SSW events. As noted above, the paper describes the comparisons in quite a lot of detail leading to unnecessary figures and text and making the paper overly long.

**Methodology** In a number of places the author compares the SSWs detected in the standard JRA-55 dataset with those detected in the other two datasets. I can see the merit in this, but wouldn't it make more sense to compare the same dates when SSWs are detected in the standard re-analysis with the other datasets. Then one can really assess the extent to which tropospheric information contribute to producing the SSW seen in the standard assimilation. Similarly, I think it could be very informative to compare the JRA55-C and JRA55-AMIP simulations in this way.

- I didn't find the following figures (and associated analysis) added much and suggest they could be removed or added to a supplement. Figures 6, 7, 9, 11, 13.

## Minor comments

Throughout I find the name 'conventional' a little confusing for JRA55-C since this is really just 'non-satellite'

p2 l15 Could you say more about the AMIP-style integration? Is this a continuous run with just SST and other boundary forcing?

p3 l15 Why did the author introduce new nomenclature for the datasets? I think using the standard names would be more useful for comparison with other studies.

p8 l3 What do you mean by 'envelope'

Fig. 2 etc. Please remove the wedge where the shading and contours don't wrap around the zero line

Fig. 5 I found the lines between the two dates (observed and observed in JRA55-C) tended to obscure the points. I think these could be removed without much loss of information.

Fig. 8 The arrows and labels in the panels made the quite hard to read and to distinguish different points. I like this plot but could it be simplified?

Fig. 10 Could you show the heatflux distribution at the bottom of each panel for the different cases to make the point made in the text about the shift between the two datasets more clearly?