

Weather Clim. Dynam. Discuss., referee comment RC1
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Comment on wcd-2021-15

Anonymous Referee #1

Referee comment on "Resampling of ENSO teleconnections: accounting for cold-season evolution reduces uncertainty in the North Atlantic" by Martin P. King et al., Weather Clim. Dynam. Discuss., <https://doi.org/10.5194/wcd-2021-15-RC1>, 2021

Review of " Resampling of ENSO teleconnections: accounting for cold season evolution reduces uncertainty in the North Atlantic"
Author(s): Martin P. King et al.

The paper argues that the nature of ENSO teleconnections to the North Atlantic sector is much more clearly known if one separates out the early winter (November and December) from mid-winter (January and February). This result builds on previous work that shows that different mechanisms are operating in early vs. mid-winter. The results are generally convincing and merit publication. I have only a few relatively minor comments for the authors

General comments:

- Given that the authors argue that splitting ND from JF is important, I think it is important to show each of these 4 months individually in a version of figure 2 with four columns and three rows, before then showing the ND and JF composites. This additional figure would help make the point to the reader that ND are more alike, and JF are more alike, before the authors then go on to combine ND together and JF together.

- There is one recent paper the authors seem to have missed that is very relevant and complementary to the present study. The size of a composite necessary for the stratospheric route in late winter to become robust was discussed in detail in Weinberger et al 2019. They concluded that the EN-weak vortex route is robust with around 15 events, though the impact of LN on the vortex was only apparent with more than 25 events (see their figure 5) as compared to climatology. They don't show the difference between EN and LN, but clearly the difference will be significant with less.

The polar cap SLP response was also found to be significant after around 15 events are taken (their figure 7) both for EN and LN. This is consistent with the results shown in the present paper.

Weinberger et al also found robust impacts on subpolar Eurasian temperatures (see their figure 7) that are robust for EN and LN individually with composite sizes similar to that used in the present paper. Weinberger et al didn't consider early winter and they analyzed historical data for a much shorter period than analyzed here, and so there are clearly new results here. But as best as I can tell the results are consistent when the late winter and the stratospheric route is considered.

Minor changes

Line 15 : I suggest adding a more general first paragraph about ENSO teleconnections. The paper jumps right in to tackling the uncertainty, and while most of the intended audience probably already knows about ENSO teleconnections, a more casual reader may not.

Figure 2 and similar: Please add to the caption and to the text the region over which the spatial correlation is computed for the Taylor diagram. Is it identical to the region shown in the bottom rows? Is area-weighting applied?

Line 195 and table 1: please clarify how you classify years as either CP-EN, EP-EN, EP-LN, or CP-LN. It would also be appreciated if a table was added that lists which years are included in each of the four composites (or alternately mark in bold or some other designation either EP or CP events on table 1).

Line 306 the publication year for the Domeisen et al review paper should be changed to 2019

Weinberger, I., Garfinkel, C.I., White, I.P. and Oman, L.D., 2019. The salience of nonlinearities in the boreal winter response to ENSO: Arctic stratosphere and Europe. *Climate dynamics*, 53(7), pp.4591-4610.