

Weather Clim. Dynam. Discuss., referee comment RC2
<https://doi.org/10.5194/wcd-2022-25-RC2>, 2022
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Comment on wcd-2022-25

Anonymous Referee #2

Referee comment on "Predictability of a tornado environment index from El Niño–Southern Oscillation (ENSO) and the Arctic Oscillation" by Michael K. Tippett et al., Weather Clim. Dynam. Discuss., <https://doi.org/10.5194/wcd-2022-25-RC2>, 2022

Building incrementally on the author's previous work, this manuscript examines ENSO and AO signals in monthly climate forecasts to examine variability in a derived tornado environment index. The manuscript reads well and the topical area is suitable for publication in WCD. I have some major concerns about several aspects of the paper, including availability of the tornado environment index data, that are elaborated on below and should be addressed prior to undergoing additional peer-review.

In general, this work offers incremental improvement to existing knowledge. The authors state this incremental advancement. The figures are of good quality, but the lack of representation of statistical significance should be corrected.

Major Comments:

- The title would suggest that the authors examined predictability of the TEI from ENSO and AO. Yet, this analysis was performed using CFSv2, and thus, is bound by the predictability of parent model and has little to do with the representation of arbitrary teleconnection patterns calculated by the authors. In fact, the authors have already published on the skill of weekly and monthly forecasts of the TEI from CFSv2 forecasts. To me, simply examining the teleconnection patterns in the model forecasts is not novel enough to warrant publication, especially considering the rather diluted discussion and findings presented in the results.
- There are no physical pathways demonstrated for the differences (or similarities) in the modulation of the TEI. For example, what is the exact constructive or destructive pathway that causes AO or ENSO to be a source of predictability? The line "whether the real world behaves the same way..." demonstrates that the authors have not examined this in reanalysis or observed data, which is very concerning.
- The authors mention the AO being the dominant mode of hemispheric variability which influences North American near-surface temp. and precipitation. This (as mentioned) is

only during the **cold season** when US tornado counts are at an absolute minimum, during months that the authors do not even examine. It is hard to reconcile this obvious dipole.

- The figures concern me about the TEI index itself and some of the conclusions drawn in the study. First, most paneled spatial plots indicate anomalies of the TEI (which is said to serve as a proxy for tornadic storms) where the background climatology should be zero. I illustrate this by showing the US and Canada tornado reports for the three study months below:

- None of the spatial maps have statistical significance which should also incorporate the false discovery rate.
- TEI, AO, and ENSO, calculations used by the authors from CFSv2 are not available. Thus, the study is not reproducible in its current form.

Additional comments:

Throughout the manuscript, it became very noticeable that the authors focused on “self-selected” citations. The first example of this is on line 33 during the discussion of the response of thunderstorm ingredients via radiative forcing. The authors cited a paper by Lepore et al., while omitting numerous other manuscripts that have examined the subject. This happens in (at least) a dozen other places in the manuscript. The last two paragraphs are particularly lazy in this regard.

- Why use a three-year average of a highly variable quantity? 15+ years should be used here for a climatology.
- ...“and not severe thunderstorm activity”. There are plenty of papers examining model forecasts of severe thunderstorm activity on the weekly and monthly timescales.
- The discussion re: sources of predictability on the non-ENSO timescale lacks context regarding many other works that have examined such timescales. One example of this would be the growing body of literature examining the MJO impacts on thunderstorms. These should be discussed here.
- The authors mention the AO being the dominant mode of hemispheric variability which influences North American near-surface temp. and precipitation. This is only during the cold season when US tornado counts are at an absolute minimum. It is hard to reconcile this obvious dipole.
- Line 72. What modification of additional variables relative to the previous study?