

Review of “Weakening of Antarctic Stratospheric Planetary Wave Activities in Early Austral Spring Since the Early 2000s: A Response to Sea Surface Temperature Trends” by Hu et al.

The authors present a comprehensive study on the trend in the planetary wave activities in September over the Antarctic stratosphere from 1980 to 2018. Using reanalysis data and numerical simulations, the authors intend to answer two questions: (1) Has the stratospheric planetary wave activity trend in the southern hemisphere been shifting since 2000? (2) What are the factors responsible for the trend shifting. The authors did a good job in address the first question. For the second question, there is a large room for improvement.

The authors stated that the changes in the stratospheric planetary wave activity trend in the southern hemisphere may be related to changes in SST, stratospheric ozone, and IPO. This paper discussed the effect of SST mostly, which was well done. However, I agree with the other reviewer that time-lags should be further considered in the analysis. The effect of stratospheric ozone is poorly addressed. In the abstract and text, it is stated “The responses of stratospheric wave activities in the southern hemisphere to stratospheric ozone recovery is not significant in simulations”. This provides no useful information to the reader as it did not answer if there is such an effect. How well does the CESM model simulate the evolution of stratospheric ozone? Specifically, Figs. 2a and 2b show a clear shift of the trend in stratospheric planetary wave activity over the southern hemisphere around 2000. It would be useful to compare it with the time series of both SST and stratospheric ozone, and both are missing in this paper. Previous studies have shown an inflection point around 1998 in the time series of stratospheric ozone from 1980-2018. An inflection point may not be very apparent in the SST time series. These may provide the authors with some hints for further analysis.

The authors can revise their paper considering the above-mentioned points.

Specific:

L94, “...SST trend”. Change to “...changes in SST”.

L118, “BDC” is defined in the abstract. Should it be defined in the text?

L148, what is H?

L161, add an “a” before the first “zonal”, and a “the” before the second “zonal”.

L180-188, provide some references.

L372, “...the SST trends”. Change to “...the change in SST”.

Be consistent. Equ. or Equation?

Figs. 2a and 2b. leave a space before and after “time series” in the title.

References:

The references are not arranged exactly in the alphabetical order by the author’s name.