1 Response to Reviewer #1's comments

The manuscript "Causal interactions between ENSO and the North Tropical Atlantic" by Thanh Le and Deg-Hyo Bae presents an assessment of the causal link between ENSO and NTA using both high-resolution climate models and reanalysis data. The idea of the manuscript is surely interesting and worthy of investigation, however it is difficult to read and the assessment needs to be strengthened from a statistical point of view. Below are my comments.

Major comments

1.1 The authors used monthly data but reconstructed indices at annual resolution (Figure 1). Then, they use Eq. S1 to assess the causality which considers yearly resolution time series. But then the authors discuss seasonal effects of ENSO and NTA. I would suggest the authors to better clarity how the analysis is carried out, unless it is not possible to replicate the results they obtained.

Response: Please see the supporting information and the references therein for additional information (Lines 16-26). We only focus on the peaking seasons of each climate mode. We do not focus on analyzing monthly data because of the different peaking seasons of each climate mode. For example, analyzing the relationship between ENSO in the decaying months (e.g., June) and NTA in the peaking months (e.g., April) is generally not of interest.

1.2 Another missing information is the number of lagged observations used for each model (p in Eq. S1) that is also strictly linked with my previous comment on the resolution. This can also affect the results since it depends on the resolution used and on the present/past observations. Which is the statistical threshold for significance?

Response: Please see the response in section 1.1. Please also see the supporting information for additional information on the degree of uncertainty (Lines 50-57).

1.3 The authors claim for a causal link between NTA and ENSO with directionality pointing from ENSO to NTA. The causality has been assessed, if I correctly understood, by using indices at annual resolution (although they used monthly data, see comment 1). Indices are firstly standardized and then the Granger causality has been evaluated, whose assessment is based on the p-value based IPCC-based recommendations. However, the Granger causality needs to be assessed with respect to a null-hypothesis that requires a statistical basis. Which is this statistical basis? Apart the p-value, did the authors performed some statistical tests based, as an example, on bootstraps procedures or random phases?

Response: Please see the supporting information and the references therein for additional information on the methods used in this work (Lines 47-57).

1.4 If the authors used yearly resolution, how the results are affected by the reduced size of samples (finite size effects)? It is the same for monthly resolution, thus a discussion and further additional tests are required to assess the robustness.

Response: Please see the response in section 1.1. Please also see the supporting information and the references therein for additional information.

Minor comments

1.5 Line 23: remove the comma before "typically".

Response: We prefer to keep the original text.

1.6 Line 24: remove the comma after "spring" and change with "and it".

Response: We prefer to keep the original text.

1.7 Lines 66-67: should be the "first principal component"?

Response: The original text is correct.

1.8 The quality of all figures needs to be improved.

Response: We will provide high quality figures.