**Author's answer to Topic Editor's comments**

Dear Mario Hoppema,

Thank you for going over our manuscript and for your comments and additional changes. Please see below a detailed response to your individual comments.

Best,

Giuliana Turi

EDITOR: Your explanation is fine, but I would expect it in the manuscript, not just in the response. If the referee doesn’t understand it correctly, most other readers will likely neither.

AUTHOR: We added the following sentences to the *Methods* section to better explain what we mean by "interannual standard deviations":

"Specifically, a monthly mean climatology is subtracted for each month creating a monthly mean time series of anomalies. The Lanczos time filtering is then applied, which removes variability on time scales longer than 10 years. From this, seasonal averages of time-filtered anomalies are created for each year. Thus, the interannual standard deviation of the seasonal anomalies is computed and used to standardize (i.e., normalize) the seasonal time-filtered anomalies."

EDITOR: As above, please modify the manuscript text to include such deliberations.

AUTHOR: We added the following sentences to the *Comparison of modeled and observed ENSO in the North Pacific* subsection:

"We chose to use the ROMS reanalysis as a comparison as it has a high spatiotemporal resolution and combines the strengths of individual data sources with those of an unconstrained (i.e., no data assimilation) ocean model, to yield a product that is more useful than either of those alone."

EDITOR: as above, please include this kind of information in the manuscript. The figure may be added to the supplementary material.

AUTHOR: We included a new figure (S1) in the Supplemental showing the drift in dissolved inorganic carbon and added the following sentences to the *Methods* section:

"The drift affects roughly the first 10 to 20 years of the simulation (see Fig. S1 in the Supplement). We opted not to remove these affected years, but rather to filter the data, in order to retain as many years as possible, given the relative brevity of the simulation."

EDITOR: Please check all the data sets used in this study and add relevant references, and/or correctly acknowledge the use of these datasets.

AUTHOR: We double-checked all the references to the data sets used in this study and made sure they were correctly acknowledged in the text and under *Data Availability*.

EDITOR: Figure 1 In the caption please use sea surface temperature not SST, and sea level pressure not SLP, etc. Also in other captions.

AUTHOR: We spelled out all these acronyms in the figure captions.

EDITOR:

Figure 2 Please add the unit
Figure 3 Please add the unit of chl
Figure 4, 5, 6, 7 Please add units of all parameters

AUTHOR: The variables portrayed in these figures are standardized anomalies and are thus unitless. We added the wording "unitless" to all of these figure captions to clear up any confusion.

EDITOR:

P24, L17 reference Di Lorenzo et al is not correct: North Pacific Gyre Oscillation links ocean climate and ecosystem change, Geophys. Res. Lett., 35, L08607, doi:10.1029/2007GL032838.
P25, L5 Frischknecht et al reference not complete
P25, L7 Garcia et al reference not complete
P25, L9 Garcia et al reference not complete
P25, L22 Hoerling et al reference not complete
P25, L24 Hoerling et al reference not complete
P26, L10 Lewis and Wallace reference is not complete.
Please check all references carefully, e.g. there are many volume numbers missing. I have indicated some issues above, but there are more.

AUTHOR: We added the missing volume numbers where applicable and double-checked all the other references.