WCD decision EGUSPHERE-2024-3270 (Kawatani et al)

Dear Dr. Kawatani and co-authors:

Thank you for the considerable work you and your coauthors have done to revise your paper. I was very happy to see that you addressed almost all of the issues raised by the two anonymous reviewers, with which I concurred. In particular, including the quantitative analysis of the sensitivity of the QBO period and amplitude to the phase of ENSO adds substantively to the manuscript. My decision on the revised manuscript is "Publish subject to minor revisions", after which I will make a final decision to accept the paper for publication.

My recommendations for final edits are as follows (NOTE: All line numbers refer to the document with the Author Tracked Changes):

i) Edit to bring the abstract more in line with the results of the paper, and remove extraneous information. Suggest the following change on lines 55-56: "…simulated La Nina periods tend to be longer than those observed during El Nino, although in most models the differences are small compared to that observed." This wording is more in line with the summary of the results in the text (e.g., line 345-6 "Only three of the nine models …simulate La Nina-El Nino differences in the QBO period that approach this observed sensitivity, even under the amplified ENSO forcing used in this study.", and the text on lines 917-919 "It is noted … the QBO period.")

ii) Also in the Abstract, delete the sentence on lines 59-61 ("The models capture … wind and temperature."). As I said in my review of the original manuscript, all models capture the equatorial tropospheric anomalies associated with ENSO for at least the past 35 years. So this statement adds nothing to the manuscript (other than prompting the reader to ask "why are they surprised at this result?").

iii) Adsf

iv) A reference is required on the statement that ends on line 155.

v) Line 216: "… representing the upper end of past variability…" refers to a vertical coordinate on "end". Change this to read "…representing the extreme of past variability."

vi) Delete the paragraph starting on line 365. This point is made more succinctly by appending a short qualifier to line 365: "as seen in Fig. 2. For further information on how model formulation and boundary conditions influence the simulated QBO, see Bushell et al 2020."

vii) Line 458, the word "uniform" is vague. Please elaborate.

viii) In reference to Fig. 11 (the original Fig. 12), Reviewer 2 asked about the total EP flux in the El Nino and La Nina simulations. You indicated in response to the reviewer that a (nicely worded) new paragraph was added to the revised text ("When averaged over … the total … is significantly larger during El Nino only in CESM1. In contrast, … between El Nino and La Nina conditions."). I couldn't find this text. If it isn't in the paper, please add it.

ix) Lines 715-end of paragraph. It should be noted that, unlike in all of the models, observations show that the easterly acceleration in the QBO is by resolved (K <= 20) waves. See Fig. 12 of Pahlavan et al.

x) Delete the gratuitous one-sentence paragraph on lines 831-832; it doesn't add any specific information.

xi) Move the text on lines 917-919 to line 853, so line 853 reads "… basic agreement with observations. However, only three of the nine models (EC-EARTH, LMDz, and ECHAM) simulate La Niña–El Niño differences in QBO period that approach the observed sensitivity (~27 %), even under the amplified ENSO forcing. The remaining six models exhibit more modest ENSO modulation 920 of the QBO period."

xii) Finally, in several places in the text, the results may be reported with too many significant digits. For example, one line 428. Let's say there are perhaps 40 QBO cycles in a 100-year simulation. The mean period will have some uncertainty, compounded by taking the difference in the period. I can't imagine there are more than two significant digits in the result, but please check. Similar comments apply to the quoted numbers on lines 222, 340-341