Response to reviewer #1

General comment
Almost all of my comments are minor clarifications or typos. The only more general comment that I have is that this work ties in nicely with recent work by Beverley et al 2021. They explored the SAM-CGT connection by performing thermal forcing experiments in ECMWF System 4 by applying a heating over the Indian subcontinent. Their results are consistent with those shown here – that SAM heating in the model is effective at driving a CGT-like wave train between Eurasia and North America, and they also hypothesize that this wave train is reinforced by the westward response associated with the Rodwell and Hoskins mechanism. Some discussion of how this work is linked to the present study would be appreciated.

We thank the anonymous reviewer #1 for their positive and helpful review. We have addressed all comments and suggestions and the manuscript is now improved in readability and a few minor mistakes have been corrected. As suggested, we now discuss the results shown in Beverley et al (2021) in the discussion section. “In general, our results also show good agreement with what is shown in Beverley et al. (2021), in which the interaction between the CGT and the SAM is explored by applying a heating source of the Indian subcontinent in ECMWF System 4. Their results show that the heating source induced by SAM convective activity is effective at driving a CGT-like wave train in northern mid-latitudes, however the response in the model is weak compared to the observed patterns.” lines 531-535

A point by point response to all minor comments is provided below.

Other minor comments/typos:
Line 43: It would be good to define the PCMCI acronym here
The meaning of the PCMCI acronym is now explicit (line 43).

Line 100: Change to “…at the beginning of July”
The text has been modified following the anonymous reviewer’s suggestion (line 101).

Line 108: Change to “…they allow one to identify…”
The text has been modified following the anonymous reviewer’s suggestion (line 109).

Line 141: Change to “As for ERA5, SEAS5 data are also regridded…”
The text has been modified following the anonymous reviewer’s suggestion (line 142-143).

Line 188: Remove “for”
The text has been modified following the anonymous reviewer’s suggestion (line 195).

Line 236: “Remover” -> “Removed”
The typo has been corrected (line 246).

Line 237: “were” -> “where”
The typo has been corrected (line 246).

Line 256: I think this should be the eastern side of the Caspian Sea, rather than western Side
The mistake has been corrected (line 267).

Line 264: “chose” -> “chosen”
The typo has been corrected (line 277).
Line 267 and Table 2: Are these spatial correlations calculated over the relevant regions e.g. 15S-30N/25-75N? It would be good to clarify this in the text and/or table caption

The text has been modified following the suggestion of the reviewer: “This similarity can be quantified by calculating the spatial correlation between each ERA-S MCA mode shown in Fig. 3a,d,g,j with the corresponding SEASS MCA mode in Fig. 5a,d,g,j, for both the tropical belt (15°S-30°N, 0°-360°E) and the mid-latitude region (25°-75°N, 0°-360°E). Results are shown in Table 2 (second column) and yield values ranging between 0.4 and 0.6.” (lines 272-279)

Line 284: “ERA-SMCA” -> “ERA-S MCA”
The typo has been corrected (line 299).

Line 290: I think SAM and CGT should be the other way around in this sentence “the effect of ERA-S CGT and SAM on Z200...”
The mistake has been corrected (line 304-305).

Line 295: It seems a bit of a stretch to call this a wave train from looking at Fig 3e, although maybe this is just because it doesn’t show up well with the significance?
We agree with the reviewer’s comment and we have modified the text as followed: “In contrast, increased SAM activity leads to negative $\beta$ values over Central Europe Z200, positive $\beta$ values southwest of Alaska and negative $\beta$ value in the eastern North Pacific Z200 (Fig. 3e).” (lines 308-309).

Line 301: I think this should reference Fig 3c not 3e
The typo has been corrected (line 315).

Line 306: As with line 290, I think WNPSM and NPH should be the other way around
The mistake has been corrected (line 319).

Line 317: Change to “…while the effect of the mid-latitude CGT pattern...”?
The text has been modified following the anonymous reviewer’s suggestion (line 330).

Line 339: “ERA-S in larger” -> “ERA-S is larger”
The typo has been corrected (line 351).

Line 400: “line” -> “lines”
The typo has been corrected (line 417).

Line 423: Remove “figures”
The text has been modified following the anonymous reviewer’s suggestion (line 441).

Line 434: I think this should be “west of the African continent”
Due to changes suggested by reviewer #2, this sentence has been removed.

Line 444: I think the negative and positive are the wrong way around in this sentence. I assume the authors are referring to precip in having it this way around, but the figures are for OLR, which has the opposite sign (i.e. positive OLR bias = negative precip bias)
Due to changes suggested by reviewer #2, this sentence has been removed.

Line 455: How many samples are there under each of these criteria?
This Information had been added in the caption of Figure S9 (former Fig. 10 has now been moved to the Supplementary Material following the suggestion of reviewer #2).
Line 489: Remove “can be noticed”
*Due to changes suggested by reviewer #2, this sentence has been removed.*

Line 495: I think this should be eastern central Africa?
*Due to changes suggested by reviewer #2, this sentence has been removed.*

Line 499: Regions (1) and (2), rather than (1) to (3)?
*Due to changes suggested by reviewer #2, this sentence has been removed.*

Line 514: I think this figure reference should be to S11i and S11l
*Due to changes suggested by reviewer #2, this sentence has been removed.*

Line 516: I think the two figure references in this sentence are the wrong way around i.e. S12i and S12l should come first
*Due to changes suggested by reviewer #2, this sentence has been removed.*

Line 517: I think this should be “stronger during ENSO phases”, rather than neutral phases?
*Due to changes suggested by reviewer #2, this sentence has been removed.*

Line 541: Remove “in total”
The text has been modified following the anonymous reviewer’s suggestion (line 501).

Line 547: “to generate” -> “generating”
The text has been modified following the anonymous reviewer’s suggestion (line 507).

Line 592: I think this should be eastern Africa, rather than western Africa
The mistake has been corrected (line 555).

Line 628: Change to “…confirm these results and their implications. Finally…”
The text has been modified following the anonymous reviewer’s suggestion (line 591).

Figures:

Figure 2a has two “actor2” – presumably one should be actor1
This mistake has been corrected in the new version of Fig. 1

Figure 3 caption: It may be good to mention what the boxes are in this caption
The Caption of Fig. 3 has been modified following the anonymous reviewer’s suggestion (line 796).

Figure 4 caption: Same as Fig 3
The Caption of Fig. 4 has been modified following the anonymous reviewer’s suggestion (line 804).

Figure 9: I would plot these on the same projection as the other maps (i.e. 15S-75N) – this might make the different features a bit easier to see
Fig. 9 has now been moved to the Supplementary Material (Fig. S8).