

Weather Clim. Dynam. Discuss., referee comment RC1
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Comment on wcd-2022-48

Anonymous Referee #1

Referee comment on "Validation of boreal summer tropical–extratropical causal links in seasonal forecasts" by Giorgia Di Capua et al., Weather Clim. Dynam. Discuss.,
<https://doi.org/10.5194/wcd-2022-48-RC1>, 2022

This paper examines the representation of tropical-extratropical teleconnections in the ECMWF SEAS5 seasonal forecast model. They use causal effect analysis techniques to examine how the South Asian monsoon and western north Pacific summer monsoon affect the circulation in the extratropics, and vice versa. They show that while the model has an overall good representation of these links, they are generally too weak in SEAS5, and also show which links in particular suffer from the largest biases. The manuscript is well written and logically laid out. I like the use of the CEN and PCMCI analysis to diagnose the potential causes of weak teleconnections in SEAS5, and believe that this work will be useful for helping identify areas which require improvement if the representation of tropical-extratropical teleconnections is to be improved in seasonal forecast models.

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.

Other minor comments/typos:

Line 43: It would be good to define the PCMCI acronym here

Line 100: Change to "...at the beginning of July"

Line 108: Change to "...they allow one to identify..."

Line 141: Change to "As for ERA5, SEAS5 data are also regrided..."

Line 188: Remove "for"

Line 236: "Remover" -> "Removed"

Line 237: "were" -> "where"

Line 256: I think this should be the eastern side of the Caspian Sea, rather than western side

Line 264: "chose" -> "chosen"

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

Line 284: "ERA-SMCA" -> "ERA-S MCA"

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..."

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?

Line 301: I think this should reference Fig 3c not 3e

Line 306: As with line 290, I think WNPSM and NPH should be the other way around

Line 317: Change to "...while the effect of the mid-latitude CGT pattern..." ?

Line 339: "ERA-S in larger" -> "ERA-S is larger"

Line 400: "line" -> "lines"

Line 423: Remove "figures"

Line 434: I think this should be "west of the African continent"

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)

Line 455: How many samples are there under each of these criteria?

Line 489: Remove "can be noticed"

Line 495: I think this should be eastern central Africa?

Line 499: Regions (1) and (2), rather than (1) to (3)?

Line 514: I think this figure reference should be to S11i and S11l

Line 516: I think the two figure references in this sentence are the wrong way around i.e. S12i and S12l should come first

Line 517: I think this should be "stronger during ENSO phases", rather than neutral phases?

Line 541: Remove "in total"

Line 547: "to generate" -> "generating"

Line 592: I think this should be eastern Africa, rather than western Africa

Line 628: Change to "...confirm these results and their implications. Finally..."

Figures:

Figure 2a has two "actor2" – presumably one should be actor1

Figure 3 caption: It may be good to mention what the boxes are in this caption

Figure 4 caption: Same as Fig 3

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

Reference:

Beverley, J. D., S. J. Woolnough, L. H. Baker, S. J. Johnson, A. Weisheimer and C. H. O'Reilly, 2021: Dynamical mechanisms linking Indian monsoon precipitation and the circumglobal teleconnection. *Climate Dynamics*, DOI: <https://doi.org/10.1007/s00382-021-05825-6>