Review of paper titled 'Assessing the ability of the ECMWF seasonal prediction model to forecast extreme September-to-November rainfall events over Equatorial Africa' by Nana et al.

Review by Indrani Roy

This paper focuses on rainfall predictability over Eastern Africa for September to November by exploring ECMWF-SEAS5.1 data during 1981-2023, Using regression, spatiotemporal and composite analyses, the authors studied extreme precipitation events and atmospheric circulations. Two lead times are used for initial conditions (IC) eg., September and August, while better skill is noted for September IC in terms of annual precipitation cycle and seasonal spatial pattern. Teleconnection between rainfall and ENSO, IOD are captured well for both ICs. Certain areas of underestimation are also identified. Results have implications for improved operational forecast and I recommend a revision.

Main points:

1. In Table 1, there are only two years for WY in L1. Mention that significant results are obtained using only two years. Similarly for SY, there are only four years for L1. Discuss briefly whether a lesser number of year has any influence on the figure that you showed in Fig. 8 (e-h).

   Also in Fig 7, there are some years those could be identified as SY in models (2015 for both L0 and L1, 2002 for L1) or WY (1984 for L1,1996 for both L0 and L1, 2021 for L0 and 2022 for L1) but were not captured in the observation. Were those years included in Fig. 8 (e-h)? Discuss those. How does the inclusion and exclusion of those years affect the results and regions with significant signals?

   In Table 1, did you check if ERA5 is also showing the same SY and WY as CHIRPS? If ERA5 is included in Fig. 7, some borderline years (eg. 1994) or other years could be different. Hence, caution should be taken in sampling the years of SY and WY part. ERA5 data are used in all analyses of mechanisms.

2. As Fig 9 shows there are differences between CHIRPS and ERA5, it is better to include ERA5 in Fig.7 as well as in Table 1. You included composites of SY and WY in Fig.10 for ERA5 too, but those years are chosen using CHIRPS. However, SY and WY of CHIRPS and ERA5 could be different based on your selection criteria of the threshold. As the sampling years are very few for observation, addition or subtraction of one or two years can make a difference.

   To overcome such issues, you might consider years where both CHIRPS and ERA5 identify the same SY and WYs. Thresholds of 1 SD can also be adjusted. All the results of compositing that you presented could still be similar; however,

The results and discussion will be much robust.

3. Caution should be taken linking any mechanisms involving the Atlantic part. Those are not very clear in the current analyses.

Line 532- 533: No significant influence from the Atlantic Ocean is seen for SY years in observation/reanalyses or models. For WY, some influence is present, but models overestimate observation/reanalyses. Also, for ERA5 it is nominal and for CHIRPS it is not from the 'eastern equatorial Atlantic ocean'. Mention those. In Fig.10, for WYs, the SST signals in box regions are practically missing in observation/reanalyses and L0; discuss that part. It indicates the asymmetric influence in WY compared to that from SY.

Line 569: Signal in the equatorial Atlantic for SST is not significant. Also, there is no signal there in Fig.11 (a, c, e, f).

Minor points:

1. Line 65: The word 'national' is used twice; omit one national.
2. In the Table 1 legend, mention what SY and WY are.
3. Line 297: You mentioned (45-60%) and check Fig.1 colour bar and make it clearer. Otherwise, modify the text. Also, the last marking for the colour bar is showing 55 instead of 56.
4. Line 299: 'values drop below 20 % over Tanzania and northwest of Kenya'- Mention the particular Figure name and IC where it drops.
5. Line 335-336: correct the grammar.
6. Line 439-444: ' The model at both L0 and L1 successfully captures this Atlantic teleconnection.' Discuss more here linking those figures, as any connection from the Atlantic as you mentioned, is not seen in Fig.4.
7. Line 475: Fift?
8. Fig. 7 caption: Top of figure- put 'Model' instead 'Mdl'
9. Results for 2nd and 3rd columns will be better if ERA5 composite years are chosen in Fig.12. Modify the discussion accordingly. Based on the current analyses, any influence from the Atlantic is not clear.
10. In Fig.14, the bottom two rows, no signal from Atlantic in models!
11. Line 676-678: Moisture flux convergence is not present in Western EA in models! It is true for L0 as well as L1.
12. Line 679-681: Physical mechanisms in eastern EA may be reasonable, but not for western EA based on the equatorial Atlantic.
13. Line 517-518: Check and discuss more. Is it clear for ERA5?
14. Line 620: What is AEJ and define it.

15. Line 728-729: 'This study demonstrates that the novel ECMWF-SEAS5 version 5.1 (SEAS5.1) outperforms its predecessors (ECMWF-SEAS5 version 5)'. You did not compare any results here with the previous model version, ECMWF-SEAS5 version 5 and hence the statement is not justified. Modify accordingly.
16. Fig S3: completely blank for d and f, and mention that. Also, no signal in the western EA.
17. 3rd bullet point in the conclusion is not clear.
18. Summary and conclusion: write in the form of paragraphs throughout and omit using bullet points.