

Earth Syst. Dynam. Discuss., referee comment RC5  
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## **Comment on esd-2021-46**

Anonymous Referee #5

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Referee comment on "Weakened impact of the Atlantic Niño on the future equatorial Atlantic and Guinea Coast rainfall" by Koffi Worou et al., Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2021-46-RC5>, 2021

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Revision of "Weakened impact of the Atlantic Niño on the future equatorial Atlantic and Guinean Coast rainfall" by K. Worou, H. Goose, T. Fichfet and F. Kucharski

General comments:

The article is a detailed analysis of the rainfall over the Guinean coast and the relation with Atlantic Niño using a pool of CMIP6 simulations in the historical period compared with observed data. The analysis is relevant, and the article convincingly shows that the rainfall will decrease over the Guinean coast as the Atlantic Niño variability will also decrease in the future.

The paper addresses relevant scientific questions and the conclusions are important for the climate science community.

I have, however, some suggestions for improving the paper from my point of view. I recommend shortening the article; I found a very large document with unnecessary figures. It is, however, good to see a lot of more information in the additional material. I have some ideas of how to reduce it below together with some typos and minor comments

specific comments and technical corrections:

- Typo in line 10 (and more). Please be aware that Bjerknes feedback is referred to Jacob Bjerknes, use Bjerknes feedback instead of Bjerkness feedback.

- Line 31 (and also the abstract), You referred to the Atlantic Niño as ATL3, but the community usually defines ATL3 as an index (SST averaged over 20W-0, 3S-3N, Zebiak 1993). Please define the index first and then explain why you identify the Atlantic Niño with ATL3 (you could also use a different acronym).
- Line 42, a reference should be added.
- Table 2. It would be good to see the boxes within the map (for instance in figure 2)
- Figure 3b and d, why ERA5 is used as a reference for the std when it is clearly biased in relation with the other observed SST datasets?, please explain in the text or in the figure caption.
- Line 132. Why do you remove the quadratic trend instead of the linear trend? It is quite clear the linear trend in the Atl3 SST in the historical period. Please show the trend of the rainfall and SST for the indexes to understand your choice.
- Figure 4a and line 255. From figure 3b and the observations, it is clear the main season for Atl3 would be JJA, why do you decide to compare the observed and simulated Atlantic Niño in JAS?. It would be useful to show correlation between SST and rainfall indexes for different seasons to realize which of the seasons is more realistic (maybe in the observation the maximum correlation is between Atl3 SST index in JJA and precipitation GG in JAS).
- As you exposed in the introduction, deconstructive interaction of Atlantic Niño and ENSO events onto the WA rainfall in some time-periods can conduct into a dipole or monopole of the rainfall anomalies (Losada et al 2012). It would be nice to see how many of those simulated and observed Atl3 indexes are correlated with Niño3 index. Thus, the rainfall pattern in figure 5 could be a mix between local and remote SST drivers.
- Line 264. Stronger correlation between Atl3-SST and SSH in models than in ORAS5 implies stronger Bjerknes feedback in the models, which I did not expected from CMIP5 models analysis (for instance Dippe et al 2018, DOI 10.1007/s00382-017-3943-z). It would be nice to see surface wind superimposed on figures 6 u-x to illustrate the 3 elements of the Bjerknes feedback.
- Paragraph from line 280 please reduce or suppress, I do not see that OC+ models are explaining important differences from GC+ models. Remove (or reduce) and explain later in the text (beginning of section 5.2)
- Figure 8 is a very interesting and illustrative view of the processes and the trends, however, Figure 9 is not necessary (figure 9a is certainly illustrative of where the mean change occurs but figure 9 overall is redundant). From my point of view figure 9 should be removed or put in the additional material. Conclusions on this part could be explained with figure 8 alone.
- Line 380 should start a new section 5.2
- Line 397 typo zonal
- I found all the discussion about figure 10 of OC models very unnecessary, indeed in your abstract you don't mention such differences. The main result about this in the abstract is "higher confidence in the reduction of the rainfall associated with atl4 over the Atlantic Ocean than over the Guinea coast". It is appreciated the detailed analysis of the different model flavours but It doesn't give any light into the main conclusion. I will leave the GG models alone, and the OC models in the additional material. Also, figure 11 b is not necessary for the conclusions, I would go for 11a alone. Please enlarge Figure 11a.
- Line 471 remove more

