



EGUsphere, referee comment RC2
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Comment on egusphere-2022-524

Anonymous Referee #2

Referee comment on "Ensemble forecast of an index of the Madden Julian Oscillation using a stochastic weather generator based on circulation analogs" by Meriem Krouma et al., EGU Sphere, <https://doi.org/10.5194/egusphere-2022-524-RC2>, 2022

Summary:

In this study a stochastic weather generator (SWG) based on the model analogs of the atmospheric circulation is formulated to predict the daily MJO index for a subseasonal lead time. The SWG method adopted by this study has been used to forecast climatic variables, precipitation and the North Atlantic Oscillation by the same authors, and this is the first time that they extend this method for the MJO prediction. The performance of the proposed method is compared against persistence, climatology, and state-of-the-art numerical models. In general the proposed method shows superior performance than both persistence and climatology forecast. Comparison against the full GCM model such as ECMWF forecast shows that the proposed model show larger RMSE (lower COR) than ECMWF model forecast for the 20-day forecast, but smaller RMSE (higher COR) than ECMWF model forecast for days 20-60.

In general, this paper is well written, and the method they proposed is interesting. One significant advantage of their method is the substantially low computational cost compared to a full GCM model (since they use the past model outputs to find the analog), but with superior performance than a full GCM model forecast for days 20-60.

It would be preferable if the authors can clarify why different variables are chosen to form the MJO index and the analog. Besides, I have some other comments shown below.

Recommendation: Major revision

Major Comments:

1. Why different variables and areas are used for RMM, and analog calculation?

Around Line 59: RMM1/2 are calculated from the satellite-derived OLR, and zonal wind at 250hPa, and 850hPa.

Around Line 84: analogs are calculated from the modeled geopotential at 500hPa, 300hPa, and OLR daily data.

Based on these, it seems you are using different variables to calculate RMM and analogs.

My questions are:

(1) what is the motivation to use geopotential at 500hPa & 300hPa, instead of zonal wind at 250hPa and 850hPa, to calculate the analog?

(2) Have you tried to use zonal wind at 250hPa and 850hPa to calculate the analog?

(3) For the analog computation, you used the model data from NCEP. Can you indicate which reanalysis datasets you are using? Are you using CFS-R from NCEP?

(4) Around line 59: RMM1&2 are calculated over the region between 15 deg N/S, while the analog is calculated based on the Indian ocean (around Line 100). I understand this is because Indian ocean is the onset place where the MJO occurs. My question is: is it necessary to only form the analog only based on the Indian Ocean? It seems that the analog formation process can be easily extended to later regions where MJO occurs. This might help the case where the initial signal is not well-captured by the initial analogs in the Indian Ocean.

2.It might be better to reorganize the section 3.2 "Configuration of the stochastic weather generator"

(1) Around Lines 110-120: Is it possible to plot some schematics to illustrate the SWG process?

(2) Line 110: "The random selection ...that are computed are the products of two weights...rules": rephrase the sentence. Also, it would be better to write an explicit equation combining w_k^c and w_k^{Φ} . Though Lines 111-118 mention how the three w terms related, but it is better to reorder the sequence here and show the explicit equations for each w term.

(3) Line 129 "The persistence and climatological forecasts are randomized by adding a small Gaussian noise": Can you further clarify what kind of Gaussian noise did you add? How did you determine the magnitude of the variance of Gaussian noise (Any justification)?

Page 30, Figure B1: Why there are so many triangular white zones in the figure? What variable (indicated by color) is plotted in this figure?

Minor Comments:

Line 11: "We compare our SWG forecast with other forecasts of MJO": It might be better if you can give a short summary (1-2 sentences) of the advantages of your methods over other MJO prediction methods in summary

Line 65 "For this paper, ..., the RMM1 and RMM2 allow to... (2004)": rephrase the sentence.

Line 74 "For instance, we consider that there is a MJO event when $A(t) \geq 1$ ". Why the value 1 is selected (any references)?

Figure 2: Is it possible to overlay the contour with p-values 0.05 so I know the correlated areas outside your boxed area.