EGUsphere, referee comment RC1
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Comment on egusphere-2022-524

Anonymous Referee #1

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., EGUsphere, https://doi.org/10.5194/egusphere-2022-524-RC1, 2022

General comments:

In this study, the authors presented the performance of ensemble MJO forecasts using a stochastic weather generator based on circulation analogs. As the MJO is an important source of predictability on the subseasonal time scale, a useful forecast of the MJO is of significant scientific and practical values. Although there have been quite a few studies on MJO forecasts, this study uses a unique approach which is novel in this area. The result is interesting. It shows that a useful skill of the MJO can be achieved at a lead-time of 40 days, which is considerably longer than most dynamical and statistical models. The paper is in general clearly written, although some clarifications and edits are needed. A little more reasoning for choice of variables and region for the analogs and explanation of the results would improve the paper.

Specific comments

- The MJO is a planetary-scale tropical disturbance, but the tropical region for the analog calculation in the Indian Ocean (Fig. 2) is quite small. It is a little surprising that Z500 in such a small region can provide information for the MJO evolution. On lines 210-214, one reason for the choice is given which is based on the composition of the RMM index. This may explain why OLR is not used, but RMM does not include Z500 either. The MJO has a baroclinic structure, but 500 hPa is in the middle troposphere that cannot capture the vertical structure. In addition, geopotential height in the tropics does not represent well wind fields. Why not using zonal winds at upper or lower troposphere? Some more explanation on the choice of variable, region, and level would be very helpful.
- Some justification for the choice of region is given on lines 217-219. The dependence of MJO forecast skill on initial phase is in fact not conclusive in previous studies. It would be interesting to see how this is the case in this study, i.e., the dependence of MJO skill on the initial phase. It would be interesting to see the skill dependence on MJO amplitude as well.

- Section 6: Some introduction is needed for the two hindcasts of numerical models POAMA and ECMWF. More information on model resolution, version, ensemble size, hindcast period, etc., should be provided. A comparison as in Fig. 10 may not be very meaningful when these forecasts are for the different periods.

Minor comments:

- Line 4: first two principal
- Line 74: an MJO event
- Lines 81-82: "over the region covering 15N-15S" is redundant.
- Figure 2 caption last sentence: It seems the case for RMM2. How about RMM1?
- Line 228: "other atmospheric circulations" à "other atmospheric variables"
- Line 278: the ensemble spread is increasing, instead of decreasing.
- 7b: How is the bias calculated? Is it the average bias of RMM1 and RMM2?
- Line 283: remove "the" in front of "a similar"
- Line 284: A large RMSE does not necessarily mean a large spread.
- Line 309: Vitart (2017) also found that the MJO skill is higher in JJA for the ECMWF model
- Line 351: machine learning

Reference:

Vitart, F., 2017: Madden-Julian Oscillation prediction and teleconnections in the S2S database. Q*arterly Journal of the Royal Meteorological Society*, *143*, 2210-2220.