Interactive comment on "Randomly correcting model errors in the ARPEGE-Climate v6.1 component of CNRM-CM: applications for seasonal forecasts" *by* Lauriane Batté and Michel Déqué

Anonymous Referee #1

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General comments:

This manuscript conducts a comprehensive evaluation of including a model-error representation, called stochastic dynamic technique, in seasonal ensemble forecasts. The stochastic dynamic technique randomly draws from tendencies, that were obtained as nudging tendencies by relaxing the model to reanalysis data. The valuation is among the most comprehensive evaluations I have ever seen for seasonal forecasts and I complement the authors to quantify statistical scores such as mean bias, spread, correlation as well as physical processes such as weather regimes and modes of tropical

variability. Great care was given to discuss the statistical significance of the results and the application of the tendencies and verification in cross-validation mode.

The results are described and interpreted with care. Unfortunately, the impact of the stochastic dynamic technique is small. I suggest to expand the discussion in the conclusions, why the impact is small and why the results of forcing with monthly mean tendencies is so similar to using 5d-consecutive tendencies.

Specific comments:

- Move discussion on page 13, l13-15 to conclusions and expand. Is there a pattern that SMM and S5D have similar impact on mean statistics, but S5D a larger impact on statistics involving the second moment?

- It would be interesting to see a map of a particular 5D-tendency to get a feeling for the spatial correlation scales.

- It might be helpful to plot the differences SMM-RED and S5D-REF for figures 5, 6 and 10 to see if there is a coherent regional signal. As the manuscript admits, the absolute plots look very similar.

Technical corrections:

- Figures: On many plots I could not see the dots signifying statistical significance. Maybe increasing the panel size would help? Sometimes different color schemes (saturated vs unsaturated) are used to distinguish significant regions.

- Figure 5: Caption still mentions z500 plots, which are now in the supplementary material

- p16, l10: neglectable -> negligible

- p3, l21: 'y' -> 'and'