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Geoscientific Model Development Discussions

Interactive comment on "Stochastic Ensemble Climate Forecast with an Analogue Mode" *by* Pascal Yiou and Céline Déandréis

Anonymous Referee #1

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General comments:

In this paper, authors use a low-cost stochastic analogue forecasting method to predict the NAO index and ground temperatures in specific locations. The idea is the following: find 20 analog situations using the sea level pressure at time t, randomly choose 1 of the 20 analogs (using a proper distance), take the corresponding successor to make the prediction at t+1, apply the same procedure until lead time t+T. Authors repeat this statistical forecast and obtain a stochastic ensemble forecast of 100 simulated trajectories. The method is original and have good performance compared to classic ones, using persistence or climatology. The introduction is very clear and is a good summary of stochastic weather generators and analog methods. However, quality of

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Discussion paper

the figures needs to be improved.

Specific comments:

- The stochastic analog forecast presented here is a nonparametric approach (in a statistical sense). At some points, the reader would like to have a comparison with simple parametric methods like an autoregressive model, building a linear regression between the SLP at time t and NAO index or ground temperature at time t+1. Another option is to build a local linear regression between the 20 analogs and 20 successors. In that case, the biases given highlighted in the q-q plots should be reduced and quality of the prediction should be improved. But the use of low-rank methods (like Partial Least Squares method) must be used. Note that using such parametric methods can also lead to stochastic forecasts, when randomly sampling on the distribution function (e.g., Gaussian with the estimated mean and covariance) of the successors.
- The quality of the figures needs to be significantly improved:
  - Fig. 1, can you remove the 2nd map an put only the 5 points of interest in the 1st map?
  - Fig. 2, what do you mean by observed average. Is it really useful? Where are the median analog forecasts? Please use T instead of N in the legend.
  - Fig. 3, plot only 1 legend (for instance in the bottom left sub-figure)? Be careful with the y-label on the right sub-figures.
  - Fig. 4-5, authors should separate Jan and Jul in 2 sub-figures (not necessarily to plot "all"). Please connect the [squares, dots, triangles] between different lead times. Use a classic boxplot to represent error bars.

Technical corrections:

- Avoid the use of "dynamical" and use "dynamic" instead.
- Can you explain the difference between "predictand" and "predictor"? Avoid the use of predictand?
- Can you remind the difference between positive and negative values of the NAO index?

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