The replies to referees are indicated in red. We thank the reviewers for pointing out unclear points in the manuscript.

Referee#1

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 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.

This is an interesting suggestion, albeit quite unusual (with respect to the available literature). We built a multivariate autoregressive (mAR1) model on SLP. To simplify numerical problems, the mAR1 model is done on the first ten principal components of North Atlantic SLP (representing approx. 80% of the variance):

$$R_{t+1} = AR_t + B_t,$$

where $R_t$is a vector of 10 PCs, $A$is a 10×10"persistence" matrix, and $B_t$is a 10-variate Gaussian centered white noise with covariance matrix Σ.

The mAR1 coefficients $A$and $\Sigma$are determined from the covariance $C(0)$ and lag-1 covariance $C(1)$matrices of SLP:

$$A = C(1)^t C(0)^{-1},$$
$$\Sigma = C(0) - C(1)^t A.$$

This procedure is similar to what was done by Michelangeli et al. (J. Atmos. Sci. 1995) to simulate a multivariate AR1 process that mimics atmospheric geopotential heights.

Ensembles of mAR1 simulations can be performed, with initial conditions from observed values of SLP, at incremental times. This is similar to the analogue weather generator of SLP presented in the paper.

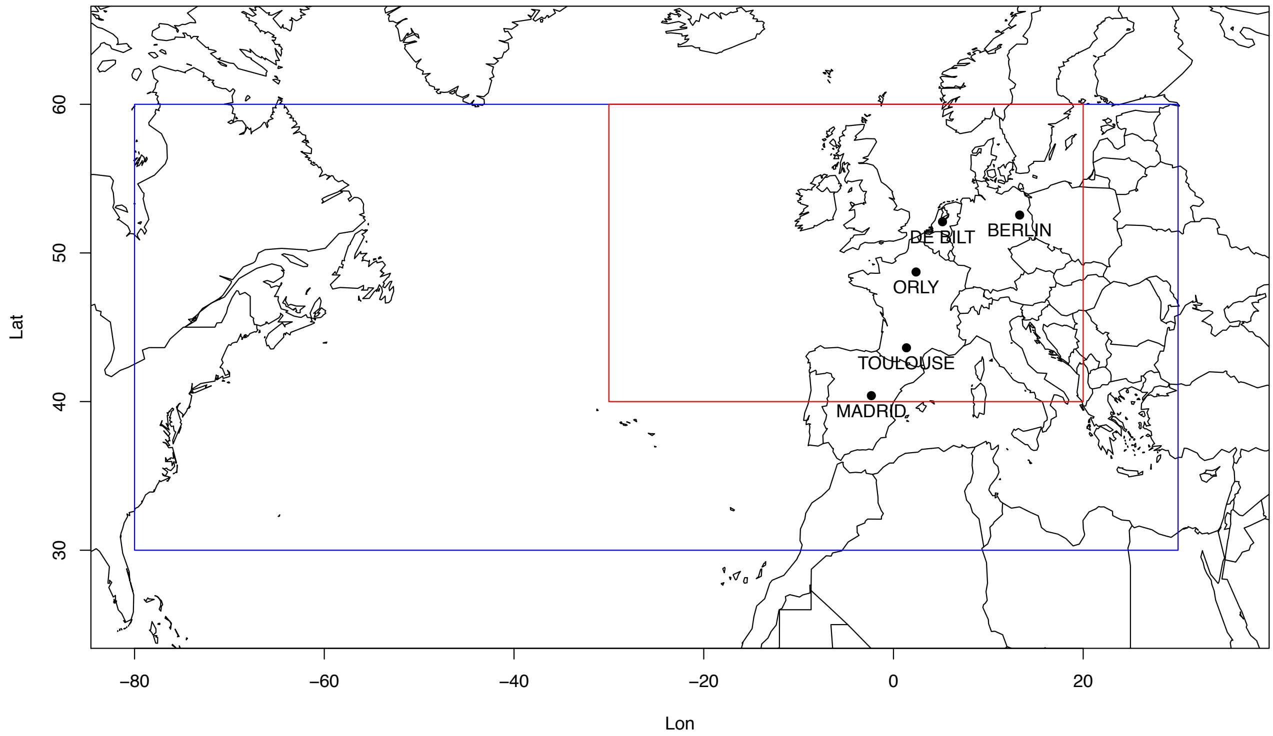
We performed a multilinear regression between the five temperature series and NAO index and the preceding values of SLP principal components:

$$X_t = [T_t^1, \ldots, T_t^5, NAO_t] = aSLP_{t-1} + b + e_t.$$

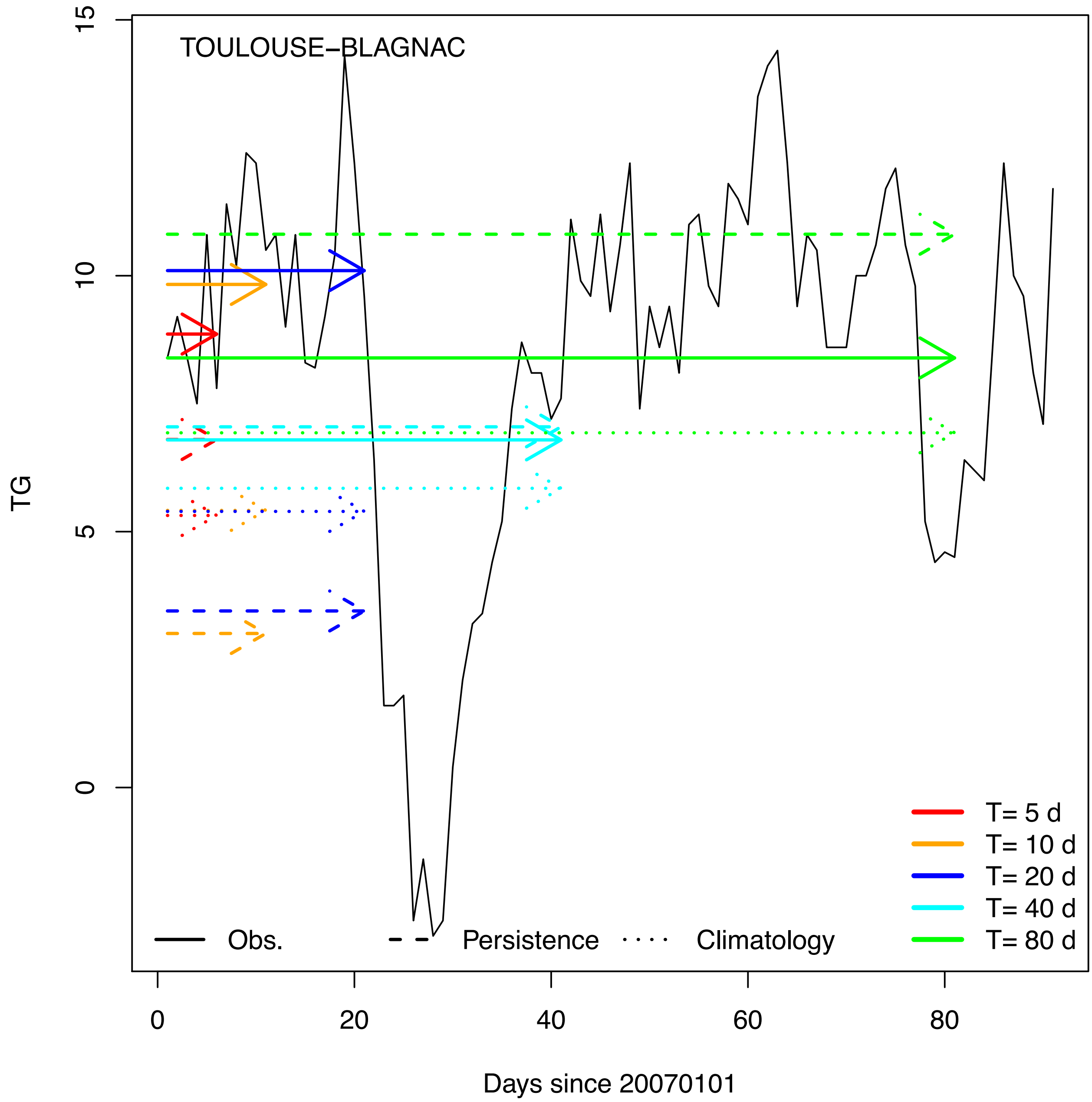
This multivariate regression is applied to the mAR1 model to perform ensembles of forecasts of temperatures and NAO index. For each realization, averages over lead times between 5 and 80 days are then performed. Such a simple model cannot reproduce a seasonal cycle of temperature (unless it is explicitly added, which we did not do). Therefore, only comparisons on the warmest (July) or coldest (January) months would be

meaningful. Such a problem does not occur with the NAO index, which does not yield a clear seasonality.
We computed the CRPSS and correlation of this stochastic model (mAR1). The skill scores always give negative (or non significantly positive) values with respect to references for temperature or NAO index. Therefore, an autoregressive stochastic model does not provide improvements over references.
In addition (we had not mentioned it but we will in the revised text), a stochastic IID perturbation is always added to the reference (climatological, persistence) forecasts. This is necessary because we compare probability distributions. This is an even simpler first order parametric stochastic model.
This will be discussed in the manuscript.

• The quality of the figures needs to be significantly improved:
–Fig. 1, can you remove the 2nd map and put only the 5 points of interest in the 1st map?
OK. The 2nd panel was removed and the 5 stations were added on the bigger 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.
It should have been “the average of observed temperatures TG between Jan. 1st 2007 to the lead time T”. This is the values that we try to forecast. The legend of the figure is changed (T rather than N). Thank you for pointing this out.



–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.
OK. The legends were removed, and grouped in an additional panel.

–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.
OK. The figures are splitted in two panels. The error bars represented the 95% confidence interval obtained from a usual formula on uncertainty on the correlation (see H. von Storch and F. Zwiers, Statistical Analysis in Climate Research, 1999, Cambridge University Press, sec. 8.2.3) between the median of forecasts and observed values. The new figures now represent the spread of correlations between realization members and observations with boxplots. The interpretation of confidence intervals is hence different (but the mean values are the same).

Technical corrections:

• Avoid the use of "dynamical" and use "dynamic" instead.

We keep the adjective “dynamical” when referring to “dynamical systems”. This is how it is used in textbooks, journal names, etc. The adjective was changed to “dynamic” when referring to the simulation mode of the stochastic weather generator.

• Can you explain the difference between "predictand" and "predictor"? Avoid the use of predictand?

Predictand is the variable that we want to predict. Predictor is the variable that is used to predict the predictand. There was a confusion p. 12, l. 32, which is now corrected.

• Can you remind the difference between positive and negative values of the NAO index?

A sentence is added to explain the pressure features during high and low values of the NAO index (p. 2, near l. 30).