EVALUATION OF FORECAST CLIMATE FROM ETA-CPTEC MODEL FOR SUBSIDIZE AGRICULTURAL RESEARCH IN BRAZIL

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Abstract

The purpose of this research is to evaluate the performance of seasonal climate forecasts of precipitation of the Eta-CPTEC model as support for planning agricultural crops. The model data were compared with the precipitation coming from MUSA project. The results showed that the model tends to underestimate the precipitation values. These results will provide information regarding the viability of incorporating weather forecasts in the agricultural crops forecast system.

Key words: crop forecasting, mean square error, precipitation.

Introduction

Agricultural production is seriously affected by climate adversities. The lack or the excess of rain are the main causes of reduced productivity.

Climate forecasts in the seasonal time scale (typically three months), are still considered experimental around the globe because the techniques involved in its realization are very recent and are still being improved.

Accurate forecasts of productivity depend not only on the crop simulation model, but also on the quality of information on the weather conditions, because crop forecasts have been developed by combining the crop forecast model with the climate forecast.

In this study, we tried to evaluate the quality of seasonal forecasts of precipitation of the Eta-CPTEC model as support for forecasts of agricultural crops in Brazil.

Results and Discussion

The study was performed for Brazil from 2001 to 2012. The data were the precipitation forecast by Eta-CPTEC model and the obtained precipitation from MUSA project as reference.

The forecasted precipitation is the result of the average of five outputs generated by Eta-CPTEC model in a regular grid of 40km.

The precipitation coming from MUSA project is obtained from rain gauges, and collected from different data sources, creating a regular grid of 25km.

First, the data were converted to the same regular grid of 40 km, and to monthly scale. To verify the accuracy of forecasts, the model was evaluated by calculating the root mean square error (RMSE) for monthly average forecasts, and by calculating the “Skill Score” on Climatology (SSC), verifying how much this forecast is more efficient than the climatology.

The RMSE is obtained by the formula:

\[ RMSE = \sqrt{\frac{1}{n} \sum (P - O)^2} \]

Being "P" the monthly value of the model variable, "O" the value observed at the station and "n" the number of observation-forecast peers.

The SSC is obtained by the formula:

\[ SSC = 1 - \frac{MSE}{MSEC} \]

Being MSE the mean square error between the predicted and observed and MSEC the mean square error between the observed and the climatological average.

Conclusions

The results of RMSE and SSC pointed out that the Eta-CPTEC model tends to underestimate the precipitation. Of all regions and periods studied, the model showed the best performance for the Brazilian Southeast, and for the months of May and year of 2010. However, more studies are still needed, for example, understand the model's performance in atypical years or that may be associated with ENSO climatic events (El Niño Southern Oscillation).

Acknowledgement

The authors would like to thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for support this scientific research, and the researcher Chou Shin Chan from the Centro de Previsão de Tempo e Estudos Climáticos (CPTEC) for the data availability.
