



## **Evaluation of seasonal forecasts of surface air temperature from Eta model for a soybean producing location in Brazil**

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Predictions of longer time scale, such as seasonal or inter-annual, have increasing benefits for improving crop yield, reducing risks of losses due to extreme climate events, making decisions of agricultural development plan. In this study, seasonal forecasts of 2-meter temperature generated from the atmospheric Eta model were evaluated in a grain producer location, South of Brazil as a prior step before applying to soy production calculations. Seasonal forecasts, out to 4 months, are produced operationally, in Brazil at INPE, the National Institute for Space Research, using the regional Eta model at 40-km horizontal resolution and a domain that covers most of South America. Initially, air temperature from meteorological station for Passo Fundo location was obtained for a soybean growing season, from November 2007 to April 2008. Then, seasonal forecasts of temperature were extracted for the same period from the Eta model. To verify the accuracy of Eta model temperatures, linear regression analysis between observed and forecast air temperature data were carried out. Furthermore, a test to determine random and systematic errors were applied, based on Willmot (1981) and Willmot et al (1985). The results showed that the best agreement between observed and forecast temperature was obtained when the systematic errors were removed ( $R^2 = 0.66$ ) according to a regression analysis. Before removing systematic errors, not satisfactory correlation was found and it demonstrates the importance of verifying the random and systematic errors and the removing these latter errors before using these forecasts. As the second part of the study, potential evapotranspiration (PE), an important component of soil water balance, was calculated based on Thornthwaite (1948) for Passo Fundo location. Calculations were applied to the observed air temperature and the forecast air temperature from Eta model with systematic errors correction. Linear regressions analysis showed good performance for PE estimated from Eta model ( $R^2 = 0.70$ ), during soybean growing season in this location. In summary, seasonal forecasts of 2-m temperature generated from Eta model and its application for PE estimation showed good results for Passo Fundo location, however, it is necessary to investigate the random and systematic errors before applying the forecasts. This study indicates that Eta model seasonal forecasts are suitable for use in agriculture sector, in particular for soybean crop in this South of Brazil location.

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