ABSTRACT

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This thesis presents results of application of adaptive filters, using the NLMS (Normalized Least Mean Square) and RLS (Recursive Least Square), to reduce deviations in weather forecasts. Discrepancies between the actual state of the atmosphere and predicted by a numerical model tend to increase over the integration period. The atmospheric model Eta is used operationally for numerical forecasting at CPTEC / INPE and as other atmospheric models, shows the accuracy of the weather forecasts. There is research aimed at introducing improvements in atmospheric model Eta 40km and others who evaluate the predictions and identify model errors for their products to be used properly. This work is intended to filter data from the Eta model and adjust them so as to minimize the error between the results provided by the Eta model and the NCEP. Thus, we employ digital signal processing techniques and images in order to improve weather forecasts Eta model. The adaptive filter in this paper will adapt the series throughout the forecast period. To train the filter regions, clustering techniques were used, such as clustering algorithm k-means so as to select climate series which have similar behavior to each other. Climate variables are the meridional wind and geopotential height in the area covered by atmospheric forecast model Eta with resolution of 40 km, to a pressure level of 250 hPa. Finally, the results show that the filter with 4 coefficients, adapted by RLS algorithm in conjunction with the criteria for selection of areas through k-means algorithm has the best performance by reducing the EQMn and dispersion of error, both the meridional wind variable and for the variable geopotential height.

Keywords: Adapted filters; weather forecast; k-*means*; NLMS; RLS.