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Improving short range forecast using linear and non-linear consensus techniques

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Ensemble forecasting approaches have been widely used by the operational weather forecasting centers and a large number of studies have been performed to improve the consensus methods that combine these ensembles. Minimizing or eliminating the forecast errors, caused by numerical models or initial conditions, should be achievable by ensemble approach which account for many possible outcomes from similar models or initial conditions. Ensemble members can be generated from the same model by running a model with different initial conditions and/or parameterizations, or completely different models developed by different centers. Consensus of all the ensemble members is obtained by several ways. Linear or nonlinear combination approaches have been applied by several studies for both short range and long-range weather forecasting on several meteorological parameters.

Our preliminary work performed on eliminating the errors of long-range temperature forecasts using nonlinear neural network approach had been used to assign weight to the ensemble members that were generated by varying the parameterizations of a single model. The results were then compared with linear combination methods. The main conclusion was the non-linear adaptive methods were able to produce forecasts that were noticeably better than linear methods or simple bias corrected ensemble mean.

The aim of this study is to apply this adaptive method for short range temperature and precipitation forecasts. Also as an improvement to the previous work, multi model ensemble forecasts rather than single multi-scheme model will be utilized as input member models. Using again neural net approaches, we will attempt to improve the forecasts of daily temperatures out to 5, 7, and 9 days. Superensemble of the same input set will be used as our control experiment and improvement over this method will be investigated.