

The Departments of Statistics and Meteorology
and Geophysical Fluid Dynamics Institute

Colloquium

“Comparison of Methodologies for Probabilistic Quantitative Precipitation Forecasting”

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Presented by

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ABSTRACT

Twenty-four hour probabilistic quantitative precipitation forecasts (PQPF) for accumulations exceeding thresholds of 0.01", 0.05", and 0.10" are produced for 154 meteorological stations over the eastern and central regions of the United States. Comparisons of skill are made among forecasts generated using five different linear and nonlinear statistical methodologies, namely, linear regression, discriminant analysis, logistic regression, neural networks, and a classifier system. The predictors for the different statistical models were selected from a large pool of analyzed and predicted variables generated by the National Weather Service (NWS) nested grid model (NGM) during the four cool seasons (DJFM) from 1992-'93 to 1995-'96. Since linear regression is the current method used by the NWS, it is chosen as the benchmark by which the other methodologies are compared. The results indicate that logistic regression performs best among all methodologies. Most notably, it performs significantly better at the 99% confidence limits than linear regression, attaining Brier Skill Scores (BSS) of 0.413, 0.480, and 0.478 versus 0.378, 0.440, and 0.457 for linear regression, at thresholds of 0.01", 0.05", and 0.10", respectively. Attributes diagrams reveal that linear regression gives a greater number of forecast probabilities closer to climatology than does logistic regression at all three thresholds. Moreover, these forecasts are more biased toward lower than observed probabilities and are further from the "perfect reliability" line in almost all probability categories than are the forecasts made by logistic regression. Concerning the other methodologies, the classifier system also showed significantly greater skill than did linear regression; and discriminant analysis and neural networks gave mixed results.

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3:30 pm 101 Love Bldg.