



# ***THE RAP SEMINAR SERIES***

## **NCAR**

---

### **From "Ensemble Spread" to Confidence in the Forecasts**

by

**Claudia Tebaldi**

National Center for Atmospheric Research  
Research Applications Program

*Wednesday, 25 September 2002, 3:30 p.m.  
Foothills Lab, Building 2, Room 1001,*

In order to derive a measure of confidence in the forecasts of the DICAST system, we first determine a distributional relationship between error in the forecast and spread among the individual modules' forecasts. The spread is defined either as the mean standard deviation or as the mean absolute deviation of the individual forecasts, with respect to the final forecast produced by the integrator.

In order to study this relationship, we use a subset of 1060 sites spread over the continental US, and perform the analysis separately for nine meteorological parameters. By collecting data (forecasts and observations for verification) at such sites over time a stable and robust relationship between spread and distributional characteristics of the error may be derived. Once the relationship is estimated, the quantiles of the distribution of the error in the forecasts -- for a specific variable and a specific leadtimes -- can be used to derive a confidence measure in the forecast.

The nature of the prediction, or the user of the prediction system, can determine a threshold for the error absolute value within which the forecast is considered "correct". At the time of the forecast output, the spread of the modules can be computed and the expected distribution of the error for that particular value of spread may be recovered by the estimated relationship. The fraction of the distribution of the error within such threshold can be straightforwardly interpreted as a measure of confidence (being by definition a number between zero and one).