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NCAR Scientist Examines Weather Forecasting Accuracy

Long-term weather prediction can be a risky business. Most forecasts produced by numerical models are accurate only up to five days. Now, a new weather prediction technique may stretch that five-day accuracy limit to 10 or even 30 days. Dave Baumhefner, a meteorologist in NCAR's Climate and Global Dynamics Division, is developing a weather prediction scheme that he hopes will substantially increase forecasting capability.

Baumhefner uses historical analyses from the National Meteorological Center (NMC) in Washington, D.C., to test his hypothesis. The NMC numerical data are entered into a supercomputer model, developed at NCAR, as an "initial state--a specific date and its known weather conditions. The computer then calculates future weather patterns by extrapolating upon the initial set of conditions. The model's result,--or "prediction,"--is then compared with what actually happened. By observing the differences between his forecast and the real world, Baumhefner can learn which processes were not accurately represented in the model and suggest possible changes.

The biggest problem with long-term forecasting is simply that forecasts and actual weather conditions diverge over time. The higher accuracies (around 70%) occur in the first few days. To lessen the margin of error between a particular forecast and the weather, Baumhefner slightly varies the initial state of each forecast. The variations in data, in turn, yield slightly different predictions. In this way, Baumhefner creates a set of ten forecasts for each initial state and then averages the results. This method makes it more likely that the model forecasts will match the weather, especially over extended periods.

So far, Baumhefner has computed 60 initial states for a total of 600 long-term weather forecasts, mostly in the 30-day range. When the average forecast of each set was compared to the actual weather, accuracy reached 40%. Baumhefner is currently refining his method. He believes that continued improvements, based on the behavior of individual forecasts within each ensemble, will soon yield 50% accuracy.

The End

Update Contact: Joan Vandiver Frisch, NCAR Media Relations, (303) 497-8607
Writer: Christopher Ernst, Media Relations Intern