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Reforecasts: what are they good for?
Using multi-decadal reforecasts from the NCEP Global
Ensemble Forecast System.

Hosted by Russ Schumacher

Thursday, November 1, 2012

ATS room 101; Discussion will begin at 3:30pm
Refreshments will be served at 3:00pm in the weather lab

Reforecasts, or hindcasts, are retrospective numerical forecasts, ideally from the same model and data assimilation system that is used operationally. We have recently created a reforecast data set for the NCEP medium-range global ensemble forecast system (GEFS). For every day from 1985 to present, we have generated 11-member ensemble reforecasts for the 00Z cycle. The forecasts extend to 16 days lead. They are initialized with the Climate Forecast System Reanalysis and use the same ensemble transform technique for generating perturbations and the same forecast model that is used operationally (T254 L42 resolution in week 1, T190 L42 in week 2). We have saved the full model state data to tape and have 99 common fields (temperature, precipitation, mandatory level data, and such) on disk, easily accessible to all.

What might one use this for? I'll demonstrate two general applications. The first is for statistical post-processing. With such a long time series of forecasts, if one has a correspondingly long time series of observations, then one can try to correct model biases even for relatively rare events such as heavy precipitation. I'll demonstrate how it's possible to significantly improve on the model forecast guidance through such statistical post-processing. Time permitting, I'll also show some other potential applications, such as for renewable energy forecasts, hurricane track corrections, and objective medium-range forecasting of tornado probabilities.

Reforecasts can also be useful for examining the ability of a forecast model to forecast relatively uncommon phenomena. I'll demonstrate how well the Madden-Julian Oscillation (MJO) is forecast in the GEFS, how well atmospheric blocking is forecast, and then how well the GEFS simulates the interactions of the MJO and blocking. Statistically quantifying the forecastability of two uncommon, interacting phenomena is relatively straightforward with reforecasts.

I hope this data set will be used by the research community, and I hope that in future years NCEP will attempt to do at least limited reforecasting in real time on their own high-performance computers (as does ECMWF currently).

Link to colloquium videos and announcement page: http://www.atmos.colostate.edu/dept/colloquia.php