A multi-year study of medium-range forecast skill dropouts

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A continuing problem in numerical weather forecasting is the occurrence of intermittent but significant “dropouts” in forecast skill. These forecast dropouts occur in all operational models to varying extents and can be seen, for example, in time series of 5-day anomaly correlation (AC) scores for 500hPa height error. In such cases, the AC on a particular day (or sequence of several days) may drop by 0.1 or more below the monthly average AC.

To study the forecast dropout issue, we have compiled a multi-year (2006-2010) archive of global model forecasts from ECMWF, GFS and NOGAPS. Forecast dropouts tend to be temporally correlated in each of the three models, which indicates that medium-range mid-latitude forecast skill (or lack of skill) is largely determined by characteristics of atmospheric flow patterns. Some large-scale flow patterns are less predictable than others, and forecast models very often tend to “bust” simultaneously during these particular regimes.

In this study we identify and describe the characteristics of flow regimes associated with medium-range forecast skill dropouts. Preliminary results indicate that 5-day 500hPa height anomaly correlation scores are anti-correlated with phase of the Arctic Oscillation (AO), and also with transitions between positive and negative phases of the AO. The forecast dropouts may therefore represent intervals of lowered skill during which the forecast/assimilation system is not adjusting rapidly enough to major transitions in the large-scale (hemispheric) flow pattern.