How much "skill" was there in forecasting ENSO from 1996 through 2002, including the 2002 El Nino onset?

Chris Landsea
NOAA/AOML/Hurricane Research Division, Miami, Florida

John Knaff
NOAA Cooperative Institute for Research in the Atmosphere,
Ft. Collins, Colorado

To provide a more stringent test for skill in seasonal El Nino-Southern Oscillation (ENSO) phenomena, a multiple regression technique has been fashioned that takes best advantage of CLImatology, PERsistence and trend of initial conditions - the ENSO-CLIPER. This new model is presented as a replacement of the use of pure persistence for determining the skill threshold for ENSO forecasting. We then redefine "skill" in ENSO prediction as "the ability to show significant improvements over the forecast capability of ENSO-CLIPER", rather than just persistence. Multiple least squares regression using the method of leaps and bounds is employed to test a total of fourteen possible predictors for the selection of the best predictors, based upon 1950-1992 developmental data. A range of zero to four predictors were chosen in developing twelve separate regression models, developed separately for each initial calendar month. The predictands to be forecast include the Southern Oscillation Index (SOI) and the Nino 1+2, Nino 3, Nino 4 and Nino 3.4 SST indices for the equatorial eastern and central Pacific at lead times ranging from zero seasons (0-2 months) through seven seasons (18-20 months). Though hindcast ability is strongly seasonally dependent, substantial improvement is achieved over simple persistence wherein largest gains occur for two to seven season (6 to 21 months) lead times.

Comparisons of ENSO-CLIPER versus the suite of statistical and dynamical ENSO prediction models available are performed for the very strong 1997-98 El Nino event, the strong and long-lasting 1998-2001 La Nina and the onset of El Nino conditions again in 2002. Additionally, we analyze the entire period of 1993-2002 when out-of-sample independent hindcasts were available from ENSO-CLIPER. Analysis reveals that some ENSO models (both statistical and numerical) do not have any true skill for real-time operational forecasting of the ENSO phenomena as they were not able to outperform ENSO-CLIPER.