

Forecasts of Nino-3 SST Anomalies and SOI Based on Singular Spectrum Analysis Combined with the Maximum Entropy Method

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Singular spectrum analysis (SSA: Vautard and Ghil 1989) and the maximum entropy method (MEM: Penland et al.1991) are combined to produce long-lead forecasts of sea-surface temperature (SST) anomalies averaged over the Nino-3 area and of the Southern Oscillation Index (SOI). The forecast is for up to one year ahead based on data from January 1950 through May 2009.

This forecast follows up on earlier forecasts using combined SSA-MEM methodology for the SOI index by C. Keppenne and M. Ghil, starting in the March 1992 issue of this Bulletin, on those of N. Jiang, M. Ghil and J. D. Neelin for Nino-3 SST anomalies, starting from March 1995, and on those of A. Saunders, M. Ghil and J. D. Neelin from September 1997. Detailed information on the forecast method can be found in Keppenne and Ghil (1992) and in the March 1995 issue of this Bulletin (also Jiang et al. 1995). Briefly, the time series is filtered by SSA so that only the statistically significant low-frequency components are retained. Next, MEM is applied to advance these components in time. The extended components are then used in the SSA reconstruction to produce the forecast values.

Figure 1 shows the method's Nino-3 SSTA forecasts for lead time of 6 months, from 1990 to 2006. The forecast for each point utilizes only the appropriate part of the record that precedes the initial forecast time. The error bars (magenta) correspond to one-standard deviation of cross-validated forecast.

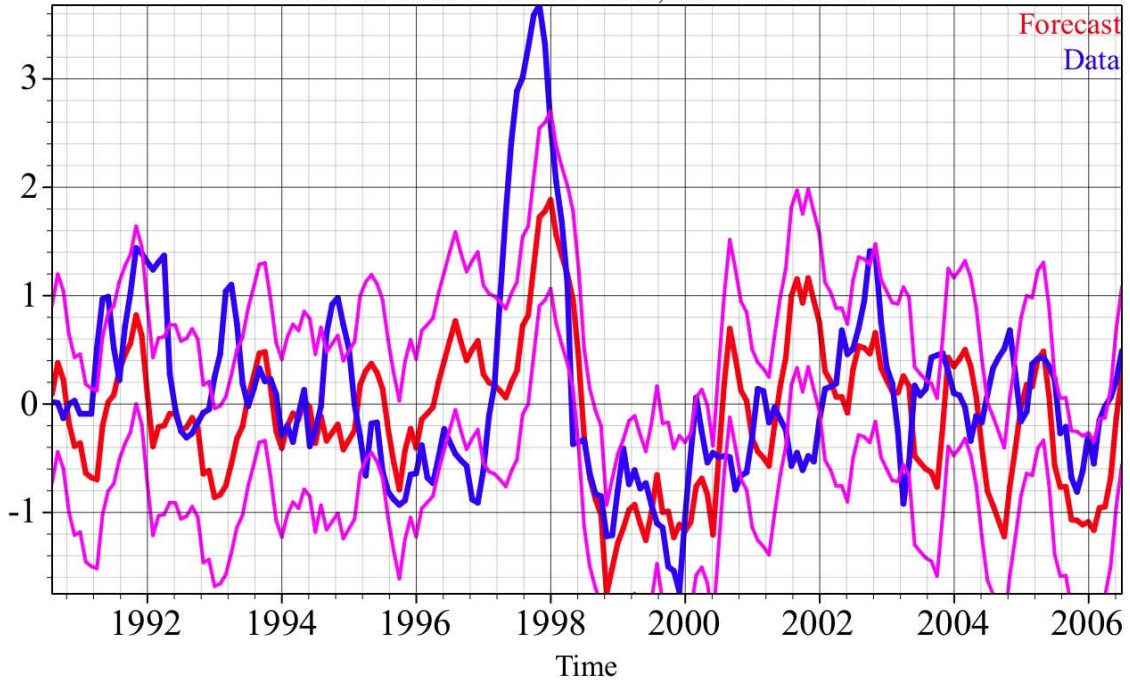
The current SSA-MEM forecast for Nino-3 SSTA (Fig. 2) is for a moderate warming by the end of 2009. The forecast SOI index (Fig. 3) is consistent with the SSTA forecast.

The error bars (magenta) in Figs. 2-3 are obtained from cross-validated forecasts for individual indices.

References:

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Cross-validated Nino-3 forecast; lead time 6 months



SSA-MEM Forecast of Nino-3 index

