



AN ANALYSIS OF A UNIVARIATE AND BIVARIATE TIME SERIES

Submitted in Partial Satisfaction of the Requirements For
the Degree of Master of Science

by

HIRANYA NILMINI DE SILVA

Coastal and Hydraulic Engineering
Department of civil Engineering
University of California
Berkeley; California.

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SUMMARY

The first part of this report is an univariate Analysis of time series data of the Southern Oscillation Index. The analysis was done in both the time domain and the frequency domain. The nature of the phenomena is such that it seems to suggest that prediction of the future will very definitely be linked to the past. Examination of the autocorrelation function and the partial auto correlation function proved that this was very definitely true. Analysis in the time domain gave some useful results and it was possible to come up with an AR(4) model.

Frequency domain analysis was not as useful since it was not possible to find constant amplitudes and phase values at the dominant frequencies. However Spectral Analysis was useful in determining the periodicity of the data, and this was found to be very close to the periodicity of the El-Nino phenomena to which the Southern Oscillation is reputed to be very closely linked. The analysis was done mainly using Splus, a very convenient statistical package.

The second part of this report is a bivariate analysis of time series data, comprising of the above mentioned SOI series, and a series of Sea Surface Temperature (SST) data. Again the analysis was done in both the time and frequency domains. In the time domain it was attempted to fit an ARMAX model. It was possible to come up with a model comprising of three SOI terms and four moving average (MA) terms. The model provided reasonable fit, but it was not completely satisfactory. Frequency domain analysis provided some interesting results even though a definite predictor model was not obtained. Analysis of the phase, gain and coherency plots together with an analysis of the auto spectra lead to a conclusion that a definite correlation between the two series existed. The significant frequencies at which such correlation was found corresponded to the recurrence interval range of the EL-Nino phenomena.

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HIRANYA NILMINI DE SILVA
University of Moratuwa, Sri Lanka.
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H.W. SHEN, Supervisor

S.L.S.C.

53580

Coastal and Hydraulic Engineering
Department of Civil Engineering
University of California
Berkeley, California.

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