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USE OF TIME SERIES ANALYSIS IN IDENTIFYING STRENGTH OF THE GLOBAL WARMING PHENOMENA IN KANDY DISTRICT

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Many scientists have identified that increased emission of greenhouse gasses have contributed to a manmade rise in global temperature and sea level, causing complicated problems, which are long lasting and least reversible. They showed that during 1958-1999 the global near surface (sea level) air temperature warmed by 0.14 ^{o}C $decade^{-1}$, and the tropospheric 850-300 mb layer warmed by 0.10 ^{o}C $decade^{-1}$. In this study, annual average temperature data of the hill capital, Kandy - Sri Lanka, were analyzed so as to check whether there were any possible patterns, trends that comply with the global warming effect. In order to predict future values, statistical models were fitted and tested using time series analysis techniques. These models were used to evaluate the strength of the global warming phenomena in Kandy district, and compared the results with the global warming strength obtained by other researchers.

Annual average temperature data, collected by the Department of Meteorology, Colombo, from their established stations in Kandy district were used for the study. First, the non-stationary time series was converted to a stationary time series by using Box-Cox transformation. Classical transformation methods were then used to estimate the trend of the series. Linear trend fittings were found to be considerably suitable. However, the residuals were not Independent and Identically Distributed (IID) series. Differencing techniques were found to be more appropriate for trend elimination. The new series obtained by differencing was then used for modelling. Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) graphs were examined to decide the order of the models. Based on the minimum AICC, BIC and likelihood statistics values, several time series models such as Auto Regressive (AR), Moving Average (MA) and Auto Regressive Moving Average (ARMA) were fitted. Estimated noise sequences of each of these models were tested as a diagnostic check. By comparing the values given by the models with actual data the best two models were selected. Finally these fitted models were validated and used to forecast ambient temperature of Kandy, up to year 2006.

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