

## ABSTRACT

### **Exploring the spatial and temporal variations of rainfall and contributing towards forecasting and understanding of rainfall in Sri Lanka**

Two models were developed based on the Markov method to predict the occurrence of rainfall. Daily rainfall data from 9 meteorology stations in Sri Lanka were analysed using these models. The results show that the models can forecast the status of a given day at an average of 73%. Higher agreement is seen for stations in the dry zone of Sri Lanka when compared with those in the wet zone. No significant difference was observed between the results obtained by using the 1<sup>st</sup> order Markov process and the 2<sup>nd</sup> order Markov process.

The spatial correlation studies indicate that weekly average rainfall could be successfully estimated by both the inverse distance weighting method and kriging. Although the results from the two methods are very similar, kriging provides a better way of estimating the errors in the estimations and hence can be used to develop models for weekly estimates. The study also showed that the strength of the correlation coefficient is dependent on the rainfall season. It was seen that spatial interpolation is more effective in dominant monsoon seasons than in inter monsoon periods.

The study on the temporal variations of rainfall showed several important facts. First, the quasi- biennial oscillation (2.0-2.7 years) is noticed in all stations, which is a regular feature of tropical climates. Secondly, as typical tropical fluctuations of climatic change, the ENSO (El-Nino-Southern Oscillation) signal of about 3 to 7 or 8 years was also identified except for Colombo. Thirdly, at a few stations only the sunspot cycle (10.8 to 11.8) can be seen (Colombo, Rathnapura, Jaffna, Hambanthota). Finally some stations indicated a long-range oscillation, for example a 43.3 years (75% level) cycle was observed for Colombo. The other observed long term oscillations, Anuradhapura (25.8 years), Badulla (41.7 years) and Hambanthota (23.8 years) were not significant at 75%.