



Low frequency climate variability and stochastic modelling of annual rainfall data

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Australian rainfall is influenced by the ENSO phenomenon and the interdecadal Pacific Oscillation. Long-term persistence in annual rainfall data as evinced by wet and dry periods result from these climatic fluctuations. The common methods used in time series analysis to characterise this persistence such as the autocorrelation function and Hurst's coefficient do not distinguish these wet and dry periods from conventional stationary time series. One approach to handle these wet and dry periods is to assume that the climate switches between two states (wet and dry) and this model has been applied to Australian rainfall data with some success. Another approach is to identify the wet and dry cycles first and model them explicitly. In this study, Empirical Mode Decomposition (EMD) was used to identify any low frequency fluctuations in annual rainfall data from 44 sites in Australia. However, the results did not allow easy identification of low frequency fluctuations in the data. As an alternative, the AR1 model, the most widely used model for the generation of annual rainfall data, was used to generate stochastic data and the EMD analysis was performed on the stochastic data as a reference base from which to identify any anomalies in the historical data. The results of the analysis comparing both the historical and generated data will be presented in the paper.