AOGS 2006


# Stochastic Generation of Multi-Site Rainfall Occurrence

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Daily rainfall is a major input to water resources and agricultural systems. As the historical record provides a single realisation of the underlying climate, stochastically generated data are used to assess the impact of climate variability on water resources and agricultural systems. Daily rainfall data generation at a single site is a well researched area in the hydrological and climatological literature. However, for assessing hydrological and land management changes over larger regions, the spatial dependence between the weather inputs at different sites have to be accommodated. This is particularly important to the simulation of rainfall, which displays the largest variability in time and space. In a recent study, it was found that the Wilk's approach performed well in comparison with a hidden Markov model and a non-parametric k-nearest neighbour model. In the Wilk's approach, the precipitation occurrence was generated by using a correlated set of normally distributed random numbers. The spatial correlations between the normal random numbers were obtained by the method of bisection using simulation. This is not only a cumbersome procedure but takes a lot of computer time if the number of stations is large. In this paper, it is proposed to use a root finding algorithm to obtain the hidden correlation between the normal variates from the estimated correlation between the rainfall occurrence processes. The model is applied to five catchments/regions, with the number of rainfall stations varying from 3 to 30, to model the rainfall occurrences and the results will be presented.