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Probability distributions comparative analysis in assessing rainfall process in time and space (Article)

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Abstract

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The need for a reliable rainfall model to produce accurate simulation of rainfall series is imperative in water resources planning. Simulated series are used when there are shortages of observed series at location of interest. This study focuses on modelling of rainfall series with a range of probability distributions representing rainfall intensity of the Space-Time Neyman Scott (ST-NS) model. Theoretically, the ST-NS model is constructed by having parameters to represent the physical attributes of rainfall process. Therefore having appropriate distributions to describe the parameters are critical so that credible rainfall series could be generated. In this study, the performance of four probability distributions namely Mixed-Exponential, Gamma, Weibull and Generalized Pareto in representing rainfall intensity are assessed and compared. Model construction of the ST-NS model involved the merging of rainfall data from sixteen stations located all over Peninsular Malaysia. Simulations of hourly rainfall series for each distribution are carried at out of sample site. Performance assessments between the distributions are conducted using Root Mean Square Error, Akaike Information Criterion, Bayesian Information Criterion, Kolmogrov-Smirnov Test and Anderson-Darling Test. Results revealed that mixture type distributions tend to perform better. The performance of both Mixed-Exponential and Generalized Pareto are very similar and both are equally good at representing rain intensity in Peninsular Malaysia. The adopted method and the results could also be extended to other tropical regions. © IAEME Publication

Author keywords

Probability Distribution Rainfall Intensity Spatial Temporal Model

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