



A Hybrid Stochastic Rainfall Model Encompassing Rainfall Variability at Yearly through Hourly Temporal Scale.

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We present a hybrid stochastic rainfall model that can reproduce various rainfall characteristics at hourly through yearly temporal scale. The structure of the model consists of four distinct modules. The first module generates the monthly rainfall using the Seasonal ARIMA model. Then, the second module generates rainfall statistics (mean, standard deviation, autocorrelation and proportion of dry periods) at the finer temporal time scale (hourly through daily) corresponding to each of the monthly rainfall generated by the first module. The third module estimates the parameters of the Modified Bartlett-Lewis Rectangular Pulse (MBLRP) model based on the rainfall statistics generated in the second module. The last module generates the hourly rainfall time series using the MBLRP model based on the parameters estimated by the third module. We applied this model to rainfall data measured at 29 gauges located across the United States. The model successfully reproduced the first and second order statistics and proportion of dry periods of the observed rainfall at hourly through yearly time scale. In addition, our model showed the improved performance in reproducing extreme values of the observed rainfall. While the traditional MBLRP models show the systematic tendency of underestimating the extreme rainfall by 10% to 40% depending on the recurrence interval, our model did not show such tendency.

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