

A Comparative Analysis of Geometric and Exponential Laws in Modelling the Distribution of the Duration of Daily Precipitation

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Abstract : Precipitation is one of the key variables in water resource planning. The importance of modeling wet and dry durations is a crucial pointer in engineering hydrology. The objective of this study is to model and analyze the distribution of wet and dry durations. For this purpose, the daily rainfall data from 1967 to 2017 of the Moroccan city of Kenitra's station are used. Three models are implemented for the distribution of wet and dry durations, namely the first-order Markov chain, the second-order Markov chain, and the truncated negative binomial law. The adherence of the data to the proposed models is evaluated using Chi-square and Kolmogorov-Smirnov tests. The Akaike information criterion is applied to assess the most effective model distribution. We go further and study the law of the number of wet and dry days among k consecutive days. The calculation of this law is done through an algorithm that we have implemented based on conditional laws. We complete our work by comparing the observed moments of the numbers of wet/dry days among k consecutive days to the calculated moment of the three estimated models. The study shows the effectiveness of our approach in modeling wet and dry durations of daily precipitation.

Keywords : Markov chain, rainfall, truncated negative binomial law, wet and dry durations

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