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Quantification of the runoff process using a new approach for multi-site generation of daily precipitation data.

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A number of stochastic models exist, which simulate weather data required for various water resources applications such as irrigation and climate change studies. However, many of them ignore the spatial dependence between station locations.

The current paper proposes a new approach for multi-site generation of daily precipitation data based on the spatial autocorrelation of the data. This theory is widely used in social, economic and physics sciences. Spatial autocorrelation is expressed using spatial statistics such as Moran's I and Geary's C indicators. In our context, the spatial autocorrelation is not only interesting because it can be computed daily, but it also defined with a spatial weights matrix which defines for each observation the degree of significance of the weather stations surrounding that observation.

The methodology is based on the use of spatially autocorrelated random numbers with a stochastic weather generator. The resulting precipitation processes satisfy the daily spatial dependence computed using the observed data. A relationship between the spatial autocorrelation of the random numbers and the daily spatial autocorrelation of the precipitation processes has been developed to specify spatially autocorrelated random numbers, which reproduce the observed daily spatial autocorrelation of precipitation processes.

To assess the effectiveness of the proposed methodology, seven stations in the Peribonca river basin in eastern Canada were used. The daily spatial dependence between occurrences and amounts of precipitation were adequately reproduced. Various criteria including total monthly precipitation and monthly numbers of rainy days were also

well reproduced.

Hydrological modeling will be used to investigate how runoff process behaves in this watershed using this new approach.