Investigation of asymmetric spatial dependence of precipitation using empirical bivariate copulas

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Authors	Suroso, S; BÃ¡rdossy, A;
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Abstract	a:2:{i:0;s:1387:"Precipitation plays an important role in any hydrological analysis. The aim of this study is to empirically investigate the behaviour of spatial dependence of precipitation fields. This would determine whether the Gaussian assumption is fulfilled in regard to symmetric spatial dependence structure between low and high precipitation values. An asymmetry function that can incorporate zero precipitation amounts is introduced on the basis of empirical bivariate copulas. The asymmetry function is calculated by integrating the empirical bivariate copula density in the upper right and the lower left parts for any given quantile thresholds. Zero precipitation amounts are handled as latent variables and the thresholds, therefore, are set to be bigger than probability of zero. The Gaussian simulations based testing is applied for determining the degree of uncertainty. The empirical bivariate copulas are constructed using the concept of regionalized variables in spatial random process with a given separating distance. For any selected time interval, the precipitation over the region of interest is assumed to be a single realization of a spatially stationary random process. The investigations are conducted in Singapore and Bavaria. To take temporal characteristics and seasons into account, precipitation occurrences with different time scales for different seasons are analysed.";i:1;s:641:"The empirical evidence proves that the precipitation events tend to follow the positive asymmetric spatial dependence structure, particularly at a short separating distance. This implies that precipitation amounts with higher intensities tends to be more spatially correlated than that with lower intensities because precipitation occurrences tend to occur in a clustered manner. Consequently, spatial precipitation models that are based on the symmetric Gaussian dependence could result in an underestimation of the spatial extent of actual precipitation extremes. Moreover, this pattern is higher for smaller time scales (hourly to daily).";}
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