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Regional growth curves and extreme precipitation events estimation in the steppe area of northwestern Algeria

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<u>Abstract:</u> A regional statistical analysis has been established for an improved estimate of extreme frequency precipitation in the steppe area of northwestern Algeria. This analysis made it possible to determine three homogeneous regions by using methods based on statistical procedures, such as the analysis of the ascendant hierarchical classification and the L-moments method. The regions thus defined accurately reflect the climatological differences and specific characters influencing precipitation patterns in the study area. The generalized extreme value (GEV) distribution has been identified as the most appropriate distribution for modeling annual maximum daily rainfall quantiles according to the L-moments ratio plot and fit-quality tests. Rainfall indices combined with the regional growth curves can evaluate in a reasonable way the maximum rainfall quantiles at the stations by using the mean maximum precipitations of the observation series. The regional approach has considerably reduced the differences caused by the disparity of the values taken by the shape parameter of the GEV distribution as a function of the observation sites, and the estimation of high quantiles becomes more spatially consistent in a region. Different forms of growth curves are characteristic for the three regions. The error reflected by the bias and root mean square error (RMSE) are below 16 and 25%, respectively, for a 100-year return period. The study provides an assessment of the maximum daily rainfalls that can be useful in the study of floods and the design of hydrotechnical works.

<u>Key words</u>: Maximum daily rainfall ; Regional frequency analysis ; L-moments ; Growth Curves ; Steppe area ; Northwestern Algeria

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