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Regional extreme precipitation frequency analysis based on L-moments method

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Abstract: In the context of climate change, the magnitude and frequency of extreme hydro-meteorological events tend to increase, which bring much losses to the society, economy and people's lives. The regional frequency analysis procedure based on L-moments is applied to the stationary and independent extreme precipitation series (Peaks over threshold, POT series) at 30 stations during 1960-2011 in the Huaihe River Basin, China. Three homogenous sub-regions are obtained via cluster analysis, and the discordancy measure test and regional heterogeneity test are carried out via 1000 Monte Carlo simulations by the four parameters Kappa distribution. Generalized Extreme Value (GEV), Generalized Logistic (GLO), Generalized Normal (GNO), Generalized Pareto (GPA) and Pearson Type 3 (P III)) distributions are used to fit the extreme precipitation series. Through the L-moment ratio diagram and goodness-of-fit measure, the GPA distribution is regarded as the optimal fit distribution. The quantile estimates with different return periods are calculated by the GPA distribution. With the increase of the return period, the root mean square error increase. The lager the observation is, the larger the relative error between observations and simulations is. The spatial mapping of the extreme precipitation is consistent with the precipitation characteristics and geographical features, which indicate that GPA distribution can well describe and make quantitive assessment of extreme precipitation in the Huaihe River Basin through regional frequency analysis based on L-moments method.
Key Words: extreme precipitation; regional analysis; POT; L-moments; the Huai he River Basin