Runoff occurrence frequency analysis of the South-to-North Water Transfer Project (Eastern Route Project)

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Abstract The description of mutual variables and frequency analysis of hydrological events can be resolved into deriving solutions from a multivariate joint distribution. For bivariate frequency analysis, the NTM (normal transform method) and EFM (empirical frequency method) were testified by Monte Carlo experiments. Results show that NTM is superior to EFM if evaluated by either unbiasedness or effectiveness. Annual discharge data within the region of the Eastern Route Project (ERP) of the South-to-North Water Transfer Project were used to analyse runoff occurrence frequencies for the Changjiang (Yangtse River), Huaihe (Huai River), Yishusi (Yishusi basin) and Huanghe (Yellow River). Outcomes demonstrate that the probability of an asynchronous runoff encountering is greater than that of the synchronous occurrence, which implies a natural advantage of ERP in re-allocating water resources among regions. The probability of being able to utilize ERP to supply water to Huanghe is about 46%, which implies a natural potential of ERP in mitigating water-related problems for the lower reach of the Huanghe River.

Key words multivariate joint probability distribution; Normal transform; Monte Carlo experiment; runoff occurrence frequency analysis; Eastern Route Project