Geophysical Research Abstracts
Vol. 21, EGU2019-12708, 2019
EGU General Assembly 2019

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Estimation of the Same Frequency Test and Recurrence Level of Rainstorm and Flood in the Design of Medium and Small Watersheds in South China
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Abstract: The rationality of design flood has a direct impact on the safety of people's lives and property in flood protection zones.The design flood is deduced from the design storm based on the assumption that the rainstorm flood has the same frequency in the current flood design of small and medium-sized basins. Therefore, the assumption of the same frequency of rainstorm flood and the probability distribution of rainstorm flood encounter have become the key to verify the rationality of design flood in small and medium watersheds. Based on the hourly rainstorm and flood observation data from 1967 to 2013 in the typical heavy rainfall basin of Caojiang River in the upper reaches of Jianjiang River, this paper firstly analyzes the marginal distribution of the maximum surface rainfall and the maximum flood peak discharge of corresponding fields, then analyzes the encounter probability of the joint distribution of rainstorm and flood peak, and calculates the design recurrence level. The main conclusions are as follows: 1) the probability of the same frequency of rainstorm and flood is small in the basin; more rainstorm and flood appear in the same frequency in the corresponding period of rainstorm and flood field; 2) the condition that the peak discharge is greater than or equal to the design value of a certain frequency when the rainfall is greater than or equal to the design value of a certain frequency in the basin. The probability decreases with the decrease of the probability of excess value; 3) The probability of rainfall and flood peak discharge encountering conditions shows that there are many flood control design criteria; 4) Compared with the "or" joint recurrence period and the "and" recurrence period, the Kendall recurrence period more accurately reflects the risk rate of R-Q combination, and the maximum probability principle does not predict the risk. The Kendall recurrence period design value, which combines the probability of surfacerainfall and flood peak discharge encountering in the same basin, can provide more reference for the selection of flood control standards and risk management.
Key words: design storm flood; hydrologic excerpt table; encounter probability; Kendall recurrence period; small and medium watershed