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Study on Early Warning of Flash Flood Based on Compound Rainfall Index

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For small watershed, the flood warning based on rainfall index is conducive to win the transfer time. The runoff is mainly determined by the rainfall and the soil moisture status at the beginning of the rainfall. Therefore, it is the most popular flash flood warning method to determine the critical rainfall corresponding to the initial soil water content. However, the above-mentioned conventional method has to rely on two kinds of information in practical application: one is the current soil moisture in the basin; the second is the future rainfall corresponding to certain period. It is difficult to obtain soil moisture, whether through monitoring or through hydrological modeling. In this paper, considering that the current soil water content is closely related to the rainfall in the past period, the " current soil moisture content" is replaced by "antecedent precipitation", and a composite rainfall index consisting of antecedent precipitation, recent rainfall and rainfall intensity is proposed. Zhuling hydrological station with catchment area of 20.1km^{2}is located in Jiangxi Province, China. The catchment of the hydrological station was selected as the study area. According to the warning flow and the measured hydrological data, the relationship between the occurrence probability of flood disaster and the threshold value of compound rainfall index is established. The applicability of the composite rainfall index to the flood warning is verified by selecting the measured flood process. The results show that when the composite rainfall index is lower than the basic threshold, the flood disaster will not occur, when the composite rainfall index exceeds the basic threshold, the probability of flooding increases with the increase of the composite index value. The occurrence of torrential flood is mainly dependent on the rain intensity, and the effect of accumulated rainfall is the second. Flash flood warning based on composite rainfall index only needs rainfall information and does not depend on soil water content. By continuously calculating the composite rainfall index and comparing with the thresholds corresponding to different occurrence probability, the occurrence possibility of flood disaster can be quickly determined. In addition, this indicator also has the advantage of simple calculation, which makes it deserve to be promoted in the hilly area.