AOGS 2006

Factors Affecting the Design Flood Derived from Design Rainfall

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In Japan, design floods have to be calculated from design rainfalls according to the manual of river works in Japan. This is very helpful to overcome the shortage of the river discharge data, and makes it possible to taking into account the changes of land surface. However, there are many factors, for example, duration of the design rainfall, enlargement of the hyetographs and coverage ratio affecting the design flood. Also these factors introduce uncertainties into the design flood that causes many problems in public involvement. The objective of this study is to evaluate the impacts of these factors by using a newly developed method to derive discharge distribution from rainfall distribution. In this method, a random cascade model (RCM) is used to probabilistically downscale design rainfall randomly into hyetographs. Then maximum discharge is calculated from downscaled hyetograph by using a rainfall runoff model. Finally, the distribution of maximum discharge can be derived numerically. This technique is applied to the Doki River basin, a small basin, where the influences of human activities are very limited. The observed annual maximum discharge data from 1976 to 1998 were used to validate the calculated distribution of maximum discharge. The impacts of the fore-mentioned factors are evaluated by using this method in this study.