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Rainfall thresholds for runoff-generatedgully-type debris flow initiation

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Bailong River Basin locates in the northeastern edge of the Tibet plateau of China. The geohazards in this area possess the characteristics of dense distribution, high-frequency of occurrence and high-intensity and are traditionally the biggest threat to local people, such as 8.8 Zhouqu debris flows that caused 1756 deaths. Heavy rainfall is the main predisposing factor of debris flow in the region, hence rainfall related indicators are intuitive and reliable in predicting debris flow activity. In this paper, GLP valley, that located at the middle reaches of the Bailong River valley, was chosen as an example of a gully type debris flow. Series of in-situ field test or experiment have been done to record and analysis the rainfall' effects in runoff generation and flow convergence processes. SCS (soil conversation system) model and flow velocity model that was based on kinematic wave equation were integrated to simulate the process. Then, Hydraulic type debris flow initiation model was used to simulate debris flow initiate process based on canal simulation experiments. All above models and experiments were synthesized to figure the critical parameters of rainfall which may lead to the formation of debris flows. At the same time, the rainfall warning threshold of GLP debris flow was obtained. In the end, historical records of the valley debris flow activity and corresponding rainfall were adopted to verify and calibrate the comprehensive model. Based on all above, the analytical method of rainfall warning threshold of debris flow could be extended to Bailong River Basin and the accuracy of the rainfall warning threshold for whole region mudslides will be improved.