Geophysical Research Abstracts
Vol. 19, EGU2017-2455, 2017
EGU General Assembly 2017

The rainstorm conditions triggering debris flows in the mountain regions surrounding Beijing

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Debris flows in the mountain regions surrounding Beijing has caused serious damage to local facilities. Though some mitigation measures were implemented after 2012, few studies were carried out to examine the relationship between rainfall threshold and forecasting level of torrential rainstorm. In this paper, the debris flows site, geological conditions, and 57 rainfall records were analyzed to exploit their distributions and rainfall thresholds, and assess the local forecasting level of torrential storm. The relationship between debris flow numbers and distance to fault can be expressed by an exponential function as N=634.5 e-0.36x. Most debris flows are located in monzonitic granite stratum, slope with SW-W aspect and gradient 15∼25°, and mountain regions with annual precipitation ranging from 430 mm∼450 mm. The rainfall threshold in the study area were identified using least square procedure and by a classification of annual mean precipitation and lithology. We found that the rainfall thresholds after classification are different and the debris flows can be triggered by I-D threshold of I= 30.1×D-0.68. The I-D threshold in area with annual precipitation above 380 mm is a little higher. The I-D threshold in area underlain by Quaternary and Granite strata is close. Assessment of the previous and revised forecasting level of torrential storm with respect to the identified rainfall thresholds proposed new rainfall amount in 30mm 1-hour, 70mm in 3-hour, and 110mm in 6-hour, which can be a reference for local debris flow predication.