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Formation characteristics, monitoring and prewarning studies of Lengmugou debris flow in Lushan earthquake disaster area, China

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Lushan earthquake triggered Lengmugou debris flow lies in Baoxing county, Sichuan Province, its gully located at baoxing county,of which the permanent resident population was more than 10,000. A large scale debris flow would bring threat to one third of the populations, and would be more serious once it blocked up the Baoxing river and formed barrier lake. The valley morphology of its debris flow gully is flaring , the catchment area covers an area of 9.44 km^2 and ranges in elevation from 996 m (fan apex) to 3,044 m make its relative differential height about 2,048m. The main gully has an average longitudinal slope of 212‰ and a length of more than 3,980 m.

The main gully is very narrow and the slope gradient of its banks are high ,in which there were plenty of colluvial deposits and pluvial alluvial sediments . Several debris flows occurred here recent years. For example,a large scale debris flows occurred on August 18,2012. 2 lives were killed and the direct economy loss caused by it exceeded 40 million yuan(RMB).

The provenance in the gully increased sharply because of “4· 20”Lushan earthquake ,make the debris

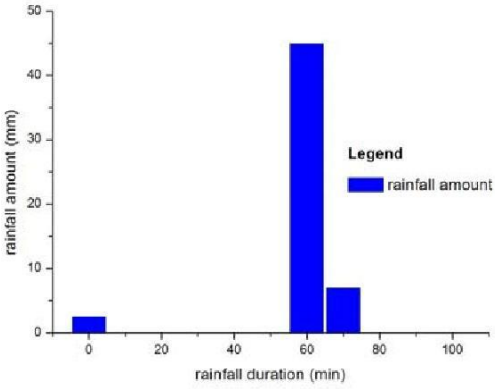

Figure 1: Relation of rainfall amount and rainfall duration

flow more easily to occurred .It is time of precipitation of main flood season from May each year， in order to protect the country, we took the emergency monitoring measures of Lengmugou. Taking account of our equipment conditions, to meet the need of ensuring safety during flood-period, we temporarily arranged 3 raingages,2 electromagnetic stage meter,3 video cameras and 1 emergency control centre etc..

It was very lucky that a small scale debris flow occurred as the time of the monitoring work just finished on May 23, 2013.Rainfall data were obtained using 0.5 mm tipping-bucket rain-gauge that was

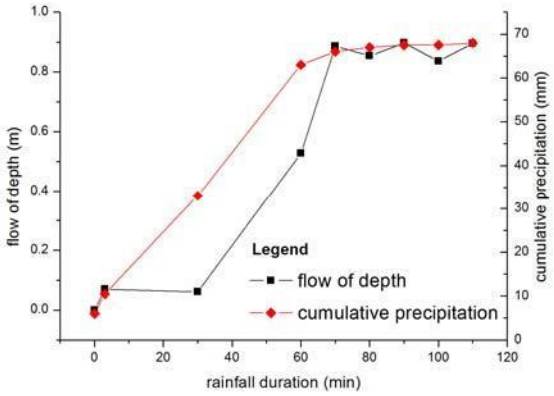

Figure 2: Relation of flow depth and rainfall duration

installed at the source area observation site. Depth was measured by two methods: electromagnetic stage meters and video cameras. An event-recording data logger was used to obtain the time of bucket tipping, providing temporal rainfall data. The maximum total rainfall was nearly 54.5mm per hour as indicated in Fig. 1. According to the data and theoretical analysis, we urgently evacuated more than 650 persons working or living in it, as well as 60 suits large mechanical equipment.

According to the monitoring data analysis, the rain is stripped which developed from the southwest to the northeast. Spatial and temporal distribution of precipitation were heterogeneous and hysteresis, Maximum flow of depth occurred later than maximum rainfall, but it was positive correlation with cumulative rainfall as indicated in Fig.2.

Because of the restriction of condition of time, climate, and equipment, transportation, the recognition may have some limitations, we will optimize and improve them in the future.

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