Topographic Research of Group-Occurring Landslide-induced Debris Flow in Dechang, Sichuan

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Abstract: A group debris flows by landslides were triggered on August 24, 2004 in Cida, Dechang County, Sichuan, China. The geological and rainfall conditions are roughly the same in the study area because the catchment size is less than 50 km^2. The only factor of determination of triggering debris flow must be topographical factor. The basin area A, channel gradient J, and the percentage (S) of catchment area with hill slope of 25° ~ 45° are selected as the topographical parameters. A new factor $G = SJ^{0.8}(A/A_0)^{0.15}$ (A_0 is unit area $= 1$ km^2) is proposed as a single topographical indicator, which may be used as a threshold for the formation of gully type debris flows by landslides. The probability of debris flow formation increases with increasing G - values. The role of slope is far more important than the role of area of catchment, and the channel gradient. With the topographical factor G, one can divide the risk grade of gully debris flow by landslides. It may be used for other areas with the geological factor and rainfall factor because the relationship is partly from the formation mechanism of gully type debris flow by landslides.

Key words: debris flow; topographical conditions; hill slope; basin area; channel gradient; topographic factor

封面照片：克柳切夫火山

克柳切夫火山（英文名 klyuchevskoy，Kliuchevskoi 或 klyuchevskaya）位于俄罗斯远东地区的勘察加半岛中东部，北纬 56.057°，东经 160.638°，主火山最高海拔 4 835 m，是勘察加半岛最高的火山。整个克柳切夫火山群形成于大约 30 万年前，包括克柳切夫、托尔巴奇克、卡缅、贝兹莫内和卡亚布利日尼亚亚等火山，覆盖了大约 5 500 km^2 的面积。克柳切夫火山相对年轻，主体形成于 7 000 多年前。它在最近的时期非常活跃，几乎每年都要爆发，引发大量的火山灰、熔岩流、火山碎屑流和火山泥石流。比如，1994 年 10 月的一次亚布里尼型爆发，产生了 13 km 高的火山灰云和 100 m 宽、2 ~ 6 km 长的火山碎屑流。高温的熔岩流导致冰雪融水引发了火山泥石流，冲毁了距离火山口 30 km 处 Klyuchi 镇的公路，并进入勘察加河。最近监测到的一次火山爆发，发生于 2013 年 10 月 20 日。

（胡凯衡）