

Trigger of landslide: earthquake or rainstorm?

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It is very difficult to differentiate the trigger (earthquake, rainstorm, or no trigger) of landslides that occurred during the pre-historical ages. Most of the large-scale landslides are generally considered to be triggered by earthquakes, although no clear evidence has been demonstrated. In order to examine statistically this hypothesis, relationship between the scale of landslides in Toyama Prefecture and the seismic intensity of the landslide sites was analyzed by GIS software. Landslide data were downloaded from the homepage of National Research Institute for Earth Science and Disaster Prevention, and the map area of landslide mass is regarded as the scale of the landslide. Seismic intensity of the site was calculated by using the empirical formula relating the magnitude of earthquake and the distance from the epicenter. Two cases were analyzed: (1) all the active faults in and around Toyama Prefecture triggered the landslides (2) the Atotsugawa fault, one of the major active faults in central Japan, caused all the landslides. The larger the seismic intensity is, the bigger the ratio of large-scale (> 500,000 m²) landslides to all landslides for both of the cases is. Assuming that all the landslides were formed by the same scale earthquake as the Hietsu earthquake (1858, M=7.0) caused by the activity of the Atotsugawa fault, the above ratio increases at a certain intensity. These results indicate that the cause of large-scale landslides is more possibly earthquake.

Another method to differentiate the trigger of landslides is analyses of sediments accumulated in the landslide-dammed lakes. The earthquake triggers the landslides in larger area than the rainstorm. In the active area like Kii Peninsula, central Japan, most of the landslides have been triggered by earthquake or rainstorm. By analyses of the dammed lake sediments formed and accumulated during the same periods and by encoding the landslide events recorded in the sediments, we could distinguish the event occurring at both sites from the event at one site; the former is earthquake-triggered, while the latter is rainstorm-triggered. We would like to carry out this kind of research in future.

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