Study on the peak ground acceleration effect on the seismic landslide

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After the South Hyogo earthquake in 1995, a method assessing the risk of a slope failure caused by the earthquake has been examined, using slope gradient, curvature, and peak ground acceleration as evaluation factors.
Consequently in the South Hyogo earthquake case study and with identical topographic condition, we confirmed the rate of landslide linearly increased with the increase of the peak ground acceleration. On the basis of this tendency, a susceptibility assessment method was proposed and has been inflected.
On the other hand, strong ground acceleration was observed during recent earthquakes, such as 2004 Niigata Chuetsu earthquake and 2008 Iwate, Miyagi inland earthquake, large-scale landslide occurred frequently.
In areas where the peak ground acceleration has been very strong, it may be different from the relationship of the peak ground acceleration and landslide rate, which was confirmed by South Hyogo earthquake.
In this study, we examined the relationship of peak ground acceleration on landslide rate and landslide scale, including strong seismic motion areas. The area analyzed in this study is 700 km^2 which is the focal region of the 2004 Niigata Chuetsu earthquake. As preparations for analysis, we extracted the position of the landslide using GIS data produced through aerial photo interpretation. In addition, we calculated topographic features such as slope gradients using DEM data (10m mesh). This DEM data was made from the contour line before the earthquake. We calculated the area rate of the landslide every 100 gal of peak ground acceleration, and every 5 degrees of slope gradient.
As a result, the relationship between slope gradient (*Slope*) and the rate of landslide area (*P*) can be explained with equation 1, in any range of peak ground acceleration. During the peak ground acceleration division the degree of leaning was almost maintained the same (around 0.1).
The intercept of the equation increased so that the peak ground acceleration of the earthquake became strong.
$\ln(P) = a \times Slope + b$ eq. 1
In this case the intercept *b* can become the function of the peak ground acceleration of the earthquake.
Subsequently, landslides were divided into two groups in terms of landslide area. We investigated relations such as the peak ground acceleration, slope gradient, slope curvature and landslide scale.
The result shows that, on the same slope gradient, the lower threshold of the maximum acceleration for the large-scale landslide (area> 1 ha) occurrence is 100 ~ 250 gal larger than that of small-scale landslide. Moreover, the threshold acceleration for large-scale landslide on convex slope was smaller 20 ~ 60 gal smaller than that of the concave slope.

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