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The traveling distance analysis of landslides for the risk management and the land use restriction, in case of Kyushu district, Japan

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To scrutinize the characteristic of the travel distance of landslides "L", the equivalent friction coefficient induced by earthquake "Mfe=H/L (H: travel height)" are compared with ones by heavy downpours "Mf". These equivalent friction coefficients are obtained from aero photo interpretations, topological analysis and field investigations. The equivalent friction coefficient of landslides induced by the earthquake Mfe is obviously bigger than ones induced by the rainfalls Mf. The result is very clear in the diagram of relation between the landslide volume V and Mf, Mfe following by multi discrimination analysis in which the discrimination rate is 100%. In an distinguish test of the average, the difference between them is also significant. The dry-saturated difference of internal friction angle obtained by shear tests with a sample of granite slope failures induced by the earthquake is twice, whereas the difference between average Mfe and Mf is almost triple. Therefore, under the condition of low soil moisture, travel distance of landslides occurred in an earthquake could be shorter than the case expected with saturated condition in such as typhoons. Hence, it is important for the risk assessment to estimate the travel distance under the condition of high soil moisture with heavy precipitation. Consequently, followings are obtained. 1)The vulnerable areas of landslide that must be subjected to the warning regulation or legal restriction can be wider than estimated from the case of earthquake, at least, in a district of Japan. 2)With the results in this study, we can properly evaluate the area range under the landslide risk, combining with the former study of the moving direction.