

Geology of landslides induced by the July 2017 rainstorm in northern Kyushu

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A rainstorm from July 5 to 6 attacked northern Kyushu and induced numerous numbers of landslides in Asakura and Hita areas with 37 fatalities and 4 missing persons. We investigated these landslides by the interpretation of air photographs provided by the Geospatial Information Authority, XRAIN analysis, topographic analysis using 1-m DEMs before and after the landslides, and field survey. We used a geologic map “Mameta” with a scale of 1:75000 published in 1933 for our study and modified it from our field survey. We found that the landslides were strongly controlled by geology.

The rainstorm started near the noon of 5th July and got weaker in early 6th and induced many landslides. We identified 3925 landslides, which were concentrated in areas with over 200 mm rainfall in 3 hours in 5 July. The landslide density was 74/km² in those areas. The landslide number and density were 942 and 89/km² in granodiorite areas and 1216 and 77/km² in pelitic schist areas. Pelitic schist is contact metamorphosed to hornfels near the boundary with granodiorite. Pelitic schist is commonly gravitationally deformed on many slopes except for the hornfels slopes, and the rainstorm-induced landslides occurred on marginal slopes of these gravitationally deformed slopes. This fact suggests that heavy rainstorms likely induce similar landslide disaster in future, because gravitational slope deformation extends deeply and continues slowly. Hornfels of pelitic schist slid rather deeper and had structural defects like wedge-shaped discontinuities and wide crush zone. Granodiorite in this area is generally weathered with corestones by spheroidal weathering. Landslides of granodiorite were generally shallow, but when it is intensely weathered to soft saprolite, landslides as deep as 6 m occurred.

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