Predicting location, magnitude, and timing of rain-induced shallow landslides: a test of accuracy and precision for the case of northern Kyushu disaster in 2017

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This study examined a methodology for predicting location, magnitude, and timing of rain-induced shallow landslides for the case of disaster caused by a rainstorm in northern Kyushu on 5th July 2017. In our approach, simulation of soil production and transport on a digital terrain model provides the thickness of sliding material on hillslopes, which is validated by a ground-based survey in the actual terrain in a selected watershed. The shear strength of the bulk soil was evaluated by direct shear tests using undisturbed specimens, and quantification of soil reinforcement by tree roots through an in-situ survey at soil pits. Hydrological monitoring was carried out at a representative hillslope for modeling the fluctuation in subsurface pore-water pressure by rainwater infiltration. By coupling all of those data and modeling, we analyzed the hillslope stability on geographic information systems, and then compared the output with a landslide inventory map to confirm the accuracy and precision of the prediction.

Keywords: shallow landslide, soil, shear strength, rainwater infiltration, hillslope stability

