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伊豆大島における表層崩壊の発生機構
Triggering mechanism of shallow landslides in Izu-Ohshima Island, Japan.

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On October 16, 2013, Typhoon Wipha attached west slope of the Mt. Mihara in Izu-Ohsima Island, Japan, and induced shallow landslides with large areas. These landslides killed 36 people, and 3 people are still missing. Sliding surfaces of these landslides were located at the boundary between high permeable scoria (and tephra) layer and low permeable loess layer. Aerial photograph investigation in the period from 1945 to 2013 showed that only one rainfall event, Typhoon Ida in 1958, induced many landslides in the area before the Typhoon Wipha. Depth of the sliding surfaces during this Typhoon was similar to that during Typhoon Wipha. We derived spatial distribution of the pore water pressure in the two-dimensional slopes with multi-layer structures on the basis of the continuity equation and equation of motion for seepage flow. Our analyses elucidated that the pore water pressure does not agree with hydrostatic pressure if the lower end of the saturated zone is not locating on the impermeable layer. Our simulation of the seepage flow during the Typhoon Wipha and Typhoon Ida showed that the pore water pressure was highest at the boundary between tephra and loess layers on which sliding surfaces of the landslides were located. Pore water pressure during other large rainfall events without landslide was below that during Typhoon Wipha and Ida. Consequently, increasing in the pore water pressure at the boundary between tephra and loess is the important factor triggering landslides in the Izu-Ohshima Island.
Keywords: landslide, pore water pressure, Izu-Ohshima, multi-layer soil structure