

## Initiation and flow characteristics of debris flows on a sediment deposition zone in a mountain area

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Debris flows is a geomorphic process, which is extremely hazardous as a result of their high velocity, long travel distance, and destructive power. However, debris flow characteristics in the initiation zones, which could possibly be affected by accumulation conditions of the storage (i.e., channel gradient and volume of storage) associated with sediment supply from hillslopes and the evacuation of sediment by debris flows, are poorly understood because of the difficulty in access. Thus, we studied the influence of accumulation condition of the storage on initiation and flow characteristics of debris flow at the Ohya landslide body in Japan by periodical terrestrial laser scanning (TLS) and UAV surveys, and field monitoring. In the Ohya landslide, debris flow occurs frequently (about three or four events per year) due to the mobilization of storage. Our study clarified that initiation location of the debris flow is highly affected by depth of the storage and water supply from tributaries. Partly saturated debris flow is an important hydrogeomorphic processes in the initiation zones of debris flow because of the steep terrain. The flow characteristics were affected by the volume of storage and rainfall patterns. Partly saturated flow dominated when total of the storage  $> 15,000 \text{ m}^3$ , while fully saturated flow dominated when total volume of the storage  $< 10,000 \text{ m}^3$ . Transition of the flow type from partly saturated flow to fully saturated flow as the surges flow down was monitored by the time lapse cameras. Therefore, debris flow characteristics in the initiation zone, which is highly affected by accumulation conditions of the storage, are sometimes different from that in the transportation and deposition zones.

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