



## **Interactions between accumulation conditions of sediment storage and debris flow characteristics in a debris-flow initiation zone in Ohya landslide, Japan**

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It is important to understand the behavior of debris flow in the initiation zone for the development of mitigative measures, such as warning systems and structures. Volume and surface topography of sediment storage in the initiation zones change with time affected by the sediment supply from hillslopes as well as the evacuation of sediment by occurrence of debris flows. However, influences of such changes on the characteristics of the debris flow are not well understood because of a lack of field data. To clarify interactions between accumulation conditions of sediment storage and debris flow characteristics in the initiation zone, we conducted field observations in the Ohya landslide, central Japan. Flows that monitored by our video-camera system could be classified as either flows comprising mainly muddy water, or flows comprising mainly cobbles and boulders. Flows comprising mainly muddy water are turbulent and are characterized by black surfaces due to high concentrations of silty shale, whereas muddy water is almost absent at the surface of flows comprising mainly cobbles and boulders. Changes in the topography in the initiation zones were periodically measured by the airborne LiDAR scanning and terrestrial laser scanning. Slope gradient in most parts of the sediment storage was steeper than  $20^\circ$  when the volume of sediment storage was large. In such cases, debris flows were usually dominated by flows comprising mainly cobbles and boulders, and topography formed by occurrence of the debris flows was also steeper than  $20^\circ$ . Simple analysis on the shear stress and the shear strength elucidates that such steep topography can be formed by movement of unsaturated or nearly saturated sediments. In contrast, slope gradient in some parts of the sediment storage was gentler than  $20^\circ$  when only small volume of sediment existed in the initiation zone. Occurrence of debris flows comprising mainly muddy water, which was usually monitored when the volume of sediment storage was small, also formed such gentler topography. Consequently, type of debris flows in the initiation zone are controlled by volume and slope gradient of the sediment storage that affect ratio of sediment and water in the flow.