Initiation and runout characteristics of debris flow surges in a huge landslide scar

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Debris flow can be extremely hazardous due to their high velocity and destructive power. Previous field observations reported that the debris flow is generally composed of multiple surges with abrupt increases and decreases in discharge. However, initiation and runout processes of debris flow surges have not been clarified yet because of difficulty in field monitoring. In this study, we successfully monitored initiation and runout processes of debris flow surges in Ohya landslide, central Japan, using a series of time lapse cameras. We also measured topography along the debris flow path by UAV-SfM before and after each debris flow event. In the period from 2016 spring to 2017 autumn, total 10 debris flows occurred in the Ohya landslide. Many of debris flows initiated on unstable channel deposits during heavy rainfall events. Initiation and termination points differed among debris flow surges even in a same debris flow event. Many surges initiated on channel deposits with depth of 3-4 m near junctions with tributaries. Debris flow surges tended to terminate in the channel sections with deep channel deposits (> 3 m depth) or gentler channel gradient. These results indicate that initiation and runout characteristics of debris flow surges are affected by spatial distribution of channel deposits, hydrological conditions, and channel topographies.

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