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Extraction of mass rock creep using airborne LiDAR

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The prediction of location of deep catastrophic landslide is important to reduce such sediment disasters. Long-lasting, small-scale mass movements called gravitational mass rock creeps sometimes lead to deep catastrophic sliding. However, surface geometry of mass rock creep is not easy to clarify. Here we used LiDAR data to clarify the surface geometry of both the mass rock creep slope and non-mass rock creep slope quantitatively. We used slope angle and eigenvalue ratio for quantifying surface geometry. Moreover, we examined roles of window size to calculate slope angle and eigenvalue ratio. We showed effectiveness of the relationship of window size with slope angle and eigenvalue ratio to characterize difference of surface geometry between mass rock creep and non-mass rock creep slope. At the mass rock creep, even if window size changed, the median value of slope gradient did not change. On the contrary, at the non-mass rock creep slope, the median value of slope gradient was small, as larger window size. The hollows and steep slope around the mass rock creep is clear only when window size was smaller than 10m. Moreover, the eigenvalue ratio was the smallest, when the window size set as one-fourth to half of the intervals of convex at the mass rock creep. Using these characteristics of mass rock creep, we proposed a new method for extraction of mass rock creep using LiDAR data.

Keywords: LiDAR, mass rock creep, deep catastrophic landslide, slope gradient, eigenvalue ratio