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Clarifying mass rock creep on steep hillslope by using helicopter borne electromagnetic survey and LiDAR.

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Massive collapses which bedrock failed might cause large-scale landslide dams and debris flows, and might afford the great deal of harm to around areas. (In the study, term of massive collapses means rapid landslides and excludes slow failures of a more chronic nature, such as deep-seated gravitational creep or rock flow.) The prediction of location of massive collapses is important to reduce such sediment disasters. A variety of mechanisms affect on the occurrence of the massive collapses Signatures of mass rock creep can be often found at the scars of massive collapses. The mass rock creep is geological structure that the bedrock on the steep slope is transformed toward under the slope by gravitation, and doesn't have a continuous slip surface as the landslide. Therefore, scarps and blocks of mass rock creep are indistinct. Moreover, in the surface geological survey, if the exposure of bedrock is limited, it might be come difficult to recognize the block of mass rock creep. In this study, we investigated surface and underground structure of the mass rock creep using the LiDAR data and helicopter borne electromagnetic survey. The study area is Mt. Wanitsuka in the southern part of Kyushu. In this area, many massive collapses occurred by heavy rain in September 2005, seven of which occurred at the slopes where could be found signatures of mass rock creep before occurrence of massive collapses. We focused on the slopes where is judged the occurrence of mass rock creep by aerophotograph and geological survey. According to distribution of the resistivity in the slope by the helicopter borne electromagnetic survey, mass rock creep slope and non mass rock creep slope are different from depth of the loosed bedrock obviously. We calculated eigenvalue ratios which express a degree the ruggedness on ground surface from the LiDAR data. As a result, it was cleared that the mass rock creep slopes have the eigenvalue ratio of a specific range, and differing compared with non-rock creep slope. Thus, it can be thought that the mass rock creep slope can be extracted in quantitatively by using the helicopter borne electromagnetic survey and the LiDAR data.

Keywords: massive collapese, mass rock creep, aerial photographic study,
helicopter borne electromagnetic survey,, LiDAR data