

The strain rate observation by the borehole inclinometer on the bedrock creep slopes in Akadani-west area

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In the disaster around Kii Peninsula in 2011, many deep-seated landslides were occurred. In order to reduce the damage, it is necessary to establish the method of the extracting dangerous slopes and to consider the countermeasures in advance. So far, the method of reading the micro topography from the topographic map such as the laser profiler, the method of judging the degree of danger from geological / topographical overview have been proposed. On the other hand, there are few cases where the strain rate was observed at the landslide dangerous slope such as the bedrock creep slope. For this reason, the validity of the past method has not been fully verified. In this study, we conducted the boring survey and observed the strain rate by borehole inclinometer on two slopes of Akadani-west area. Also, based on this observation value, the validity of the risk method by the past study was examined.

First, we calculated the strain rate (the value obtained by dividing the length of the landslide scarp by the slope length) from the topographical data obtained by the laser profiler at the two slopes in Akadani-west area. We also evaluated the risk of the two slopes using the method to evaluate the risk from geology and topography by Chigira et al. In addition, we conducted the airborne electromagnetic survey, and the degree of strain was also investigated from the resistivity distribution of the ground. By these methods, after evaluating the degree of risk, two boring investigations were conducted on each of the two slopes. At the borehole location, the strain rate was observed by the borehole inclinometer. Through these, the consistency of the observed data and the risk assessment results was verified.

The strain rate of Akadani-west I district was 4.1%, and the risk by the method by geology / topography was IV. The strain rate of Akadani-west II district was 2.7%, and the risk by the method by geology / topography was II. From this, we have found that the degree of the risk in the Akadani-west I district is higher than that of II by the risk assessment by the past research. In addition, the strain rate by the borehole inclinometer was 0.6mm/year, 1.0mm/year in Akadani I and II districts, respectively. For this reason, we have found that the danger level in the Akadani-west II district is higher by the observed data. On the other hand, in the resistivity distribution by the airborne electromagnetic survey, a large change in resistivity was seen in Akadani-west II area, and it was found that the consistency with the actual observed data was obtained. From this, we have found that there is a possibility that the degree of the risk can be accurately evaluated by combining the plural methods.

Keywords: Bedrock creep, Borehole inclinometer, Strain rate