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The research in regarding with electrical resistivity tomography at landslide area in Nishi-ikawa,Tokushima,Japan

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Landslide is one of the severe disasters triggered by rainfalls or earthquakes. Recently, landslides tend to increase by global-warming. This research pays an attention to the rainfall-induced landslide. So far, we are trying to develop the early warning system for the landslide using self-potential (SP) measurements. The previous our indoor experiments provide some important facts in landslide process for hydrological, geotechnical, and electromagnetic senses; (1) expansion of saturated area under the ground, (2) changes of underground water flow from vertical to lateral directions, (3) apparent soil displacement 2-30 minutes before the main landslide, (4) good agreement between saturated area and area with low SP value, and (5) appearance of transient signals 2-30 minutes before the main landslide. These facts should be validated in in-site measurements. In general, to monitor underground water condition, pore-pressure meters are used but they are likely to disturb hydraulic system underground due to drilling. On the other hand, electrodes for SP measurements do not disturb it because they are installed near the surface. So there is an advantage in SP approach to monitor actual slopes. In this study, we perform electrical resistivity tomography and core sampling by borehole drilling as preliminary tests.

The test area is the slope at Nishiikawa, Tokushima, Japan. The Disaster Prevention Research Institute Kyoto University installed sensors such as extention meters to monitor the slope. We perform electrical resistivity tomography for this slope. We set up 6 lines in this study. 2 lines set to lateral to the landslide segment, and 4 lines cross segment. The inter-electrode distance of the experiment are 1m and/or 2m for each line. Then we have drawn 2 dimensional resistivity map for cross-sections and a quasi-3 dimensional map from the observed data. The results show that there are low resistivity region at shallower depth ($<$ 3 m). In order to evaluate the resistivity tomographic results, we drilled 2 boreholes to investigate core sample and found an impermeable layer with lay material around 3m depth. This is the very consistent with the electrical resistivity tomographic results. Through these facts, it is safe to say that the estimation on slip surface of the landslide segment seems adequate. In next step, an in-situ test system for monitoring practical slope will be constructed at the slope. The details will be given at our presentation.