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Self potential measurement at landslide site in Pelabuhan Ratu, Indonesia

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Recently, rainfall-induced landslides occur frequently. In order to mitigate landslide disasters, understanding of the landslide process and early warning is important. In this study, self-potential approach has been attempted to develop an early warning system for rainfall-induced landslides. The laboratory experiments of landslides under the controlled artificial precipitation and a sandbox have been performed. Their results show the capability to monitor the subsurface water condition using the self-potential method. However, laboratory experiments have limitations in scale and soil layers. Therefore, it is necessary to verify the obtained results by a field (in-situ) experiment.

In July 2009, in order to assess the adequacy of the place as a field site, the electrical resistivity tomography has been performed to estimate the subsurface structure, identify saturation zone, and sliding surface. The result shows that saturation zone and possible sliding surface exist at a depth of 10-20m and 20-25m, respectively.

In August 2010, we installed 39 non-polarizing (Pb-PbCl2) electrodes at 13 points. At each point, we buried the electrodes at a depth of 1.0m, 2.5m and 4.0m. And in order to check the relationship between self potential and water or soil displacements, 25 tensiometers and a rain-gauge have been installed. Additionally, 3 boreholes have been drilled to verify electrical resistivity tomography results. Two of them is used for clinometer measurements every month to identify slip layers and one of them is for measure of water table. During the installation, impermeable layer around 4 m deep have been also found. This is also a possible slip surface. The continuous data are available after December, 2010 and now the data are going to analyze. The details will be presented in our presentation.