

Investigation of landslides on inner slope of Mt.Aso caldera triggered by heavy rainfall in Northern Kyushu in July 2012

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Mt. Aso caldera is one of the largest calderas in the world. It is also known for typhoons and heavy rainfall during the rainy season. These relatively annual events have triggered shallow landslides and debris flows, which have caused severe casualties, destroyed properties and displaced local city dwellers. From July 11 to 14, 2012, an intensive rain fell on the Northern Kyushu during rainy season. a value higher than the highest local precipitation recorded in the last decade. This high precipitation triggered shallow landslides, especially around the rim of the caldera, which affected many villages and local settlers. Detailed field investigation was conducted to study the motion mechanism of shallow slope failures triggered by the heavy rainfall. A representative site, which is located in Ichinomiya, Aso-gun, Kumamoto Prefecture was selected for this study. Several field geotechnical tests were carried out in the landslide site. Portable cone penetration tests were conducted to evaluate the nature and degree of consolidation of the sediments which are mainly composed of tephra and pyroclastics; in-situ permeability tests were conducted with variations in depth of hand-drilled bore holes so as to measure rainfall infiltration rate. Representative soil samples were collected from different layers of the main scarp for particle size distribution analysis, shear strength tests, and other laboratory soil strength analyses. Results obtained from detailed field and laboratory investigations carried out in the area show that the main factors contributing to the occurrence of shallow landslides and debris flows are incessant rainfall, surficial drainage and runoffs, topography, geologic and soil strength properties. These factors are enhanced by the interplay between the steep wall of the caldera (over 30 degrees) and high precipitation coupled with high number of irregular cracks that acts as conduits for easy infiltration to subsurface drainage system. Another process that could have affected the slope stability could be from steady undercutting of the slope toe by strong surface floods, which overtime reduces the shear strength of the material leading to shallow sliding failure.

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