Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

HDS06-P10 Room:Convention Hall Time:May 23 18:15-19:30

Experimental examinations of the soil-water characteristics of a loess soil, China

Yao Jiang[1*], Wenwu CHEN[2], Guanping SUN[2], Gonghui Wang[1], Toshitaka KAMAI[1]

[1]Research Center on Landslides, DPRI, Kyoto University, [2]School of Civil Engineering and Mechanics, Lanzhou University

In Northwest of China, many loess landslides have occurred without obvious triggering factors (i.e., rainfall, earthquake, etc). These landslides have loess that is desiccated from the ground surface to a considerable depth, and pore-water pressure at shallow depths is generally negative with respect to atmospheric pressure. To understand and analyze the pore-water pressure distribution of these slopes and then provide evidence for their stability analysis subjected to matric suction, it is essential to study soil-water characteristics. Furthermore, the soil-water characteristic curve (SWCC), representing the relationship between volumetric water content and matric suction, has been developed to interpret and predict the mechanical behaviors of unsaturated slopes. In this study, A set of experimental trials were carried out to examine the influences of initial dry density, moulding water content and particle size fraction upon the soil-water characteristics of loess soil in Northwestern China. The experimental results were obtained by using a conventional volumetric pressure-plate extractor. The results indicated that volumetric water content had a monotone-decreasing nonlinear relationship with matric suction for all loess specimens. However, the dry density had considerable influence on soil-water characteristics. When the dry density increases, the air-entry value increases and rate of desorption decreases. Moreover, by comparing the soil-water characteristics of the specimens that have the same dry density but were compacted at different initial water contents, it was found that the initial moulding water content could affect soil structure (aggregation) significantly. Higher initial water content specimens had a higher air-entry value and a lower rate of desorption. The specimens with different particle size fractions appeared to exhibit distinct soil-water characteristics. A coarse-grained specimen had a lower air-entry value and higher rate of desorption compared with a fine-grained specimen.

Keywords: loess landslide, soil-water characteristic, dry density, water content, particle size fraction