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Field experiment on rainfall infiltration under natural rainfall conditions

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Rainfall is one of the main factors which induces some geological disasters, such as landslide and debris flow. In order to explore the mechanical mechanism of rainfall-induced landslide, a field experoment was performed to monitor the changes of soil infiltration velocity and pore gas pressure on a slope, which is located in the ShaHe East Road, YiChang city, HuBei province.

The results of this experiment suggest that the change of slope water content caused by rainfall infiltration mainly appears at the beginning of the rainfall, the water content in the shallow areas increasing rapidly and tends to a steady state, meanwhile there is no significant change in the deep areas because of the obstructive effect on the rainfall infiltration by pore air pressure. The local confluence caused by the inhomogeneity and connectedness of soil increases the squeezing effect of infiltration rainwater on the pore air, so the maximum amount of pore air pressure in the rainfall process is bigger than the maximum rainfall. What's more, the maximum pore air pressure in shallow areas maintains a relatively steady state during a intermittent rainfall. Besides the pore air pressure in deep areas keeps increasing during the second rainfall process for the good gas seal condition formed by the former rainfall, which shows "The superposition phenomenon".

In a summary, the experiment proved that although the field envirnoment under different topography, soil structure, soil quality and rainfall conditions is more complicated than laboratory environment, pore air pressure still has an obstructive effect on the rainfall infiltration. The value of pore air pressure is related to initial water contention of soil because the squeezing interaction between water and air could be enhanced by the higher initial water content of soil, which also induces larger breakthrough pressure gradient and pore air pressure.