

Characterization of the vertical unsaturated flow for an integrated prediction of the storm runoff response and landslide initiation on a hillslope

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Studies on hillslope hydrology have demonstrated storm runoff responses are generated mainly through subsurface flow instead of overland flow, and studies on erosion control have empirically revealed landslides usually occur at the time of intense rainfall after a large cumulative rainfall. based on these findings, we have to explain with consistency that the flow generation mechanism for large magnitude storms on hillslope can produce both hydrograph responses below a threshold condition of rainfall and a landslide initiation above the threshold. Recent observational studies have shown vertical unsaturated flow within a hillslope soil layer may dominantly control the responses of ephemeral groundwater table to storm rainfall through the pressure-head propagation and that the responses are rather transmitted to the stream runoff with little modification. The present study discusses the reason why the vertical unsaturated flow can produce the runoff responses during large magnitude storms and provides a perspective on an integrative prediction of the storm runoff response and landslide initiation

Keywords: Integrated prediction of storm runoff and landslide initiation , Hillslope hydrology, Vertical unsaturated flow, Soil-layer evolution