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Influence of El-Nino adapted rainfall event on partially saturated slope behavior
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Abstract
This paper investigates the effect of El-Nino rainfall pattern on the unsaturated slope behavior in terms of the generation of pore-water pressure and factor of safety. The El-Nino can carry dry weather and warm ocean which may lead to the occurrence of increased rainfall. This phenomenon is common in Malaysia and it has hit the nation for so many years. Throughout the event, a landslide is prone to take place and may lead to fatal accidents. Typically, Malaysian soil is classified in residual and have high vadose zones especially during the dry period. Due to high-intensity rainfall, the reduction in soil suction can be seen happening drastically, thus reducing the soil strength. This study aims to capture the unsaturated slope behavior and stability due to the influence of El-Nino adapted rainfall event. The objective is to determine the significant rainfall intensity that affects the soil suction and the factor of safety via modification using the idealised rainfall approach and El-Nino adapted event. In this paper, a series of real rainfall in 2006 from the Department of Irrigation and Drainage (DID) Malaysia was used, labelled as the actual rainfall on numerical slope models. The slope geometry is illustrated according to a failed slope in Kolej Ibrahim Yaakub, UKM and the soil parameters and flow characteristics are gathered from the literature. By considering a very low groundwater table, the actual rainfall shows no significant reduction of pore-water pressure. Nevertheless, as the rainfall pattern is reformed with an idealised approach and adapted to the El-Nino rainfall event, the pore-water pressure and factor of safety estimatedly reduced. Captivatingly, El-Nino adapted rainfall for December 2006 event with lower average monthly intensity but continuously showed high rainfall intensity in the beginning and ending phase. The adapted rainfall has affected the pore-water pressure with 3 kPa different and the factor of safety decreased down to 1.95. It is significant that the change and decrease in the slope behavior and stability, respectively, are caused by the unsaturated soil properties and the rainfall intensity itself since the groundwater level is too deep to influence the results.

Author Keywords
El-Nino; Factor of safety; Idealised approach; Pore-water pressure; Slope

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